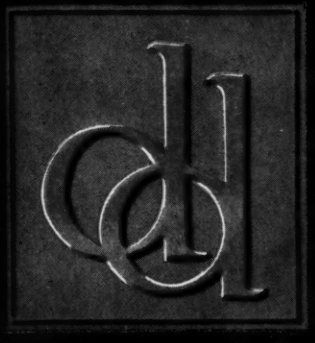
THE DENTAL DIGEST



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About Our

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(Biographies continued on page 125)

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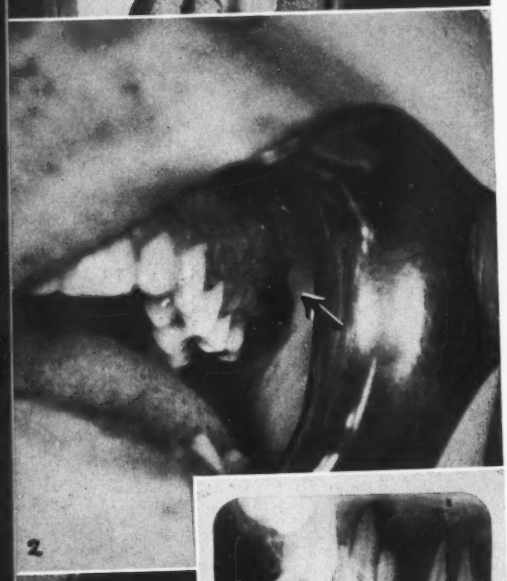
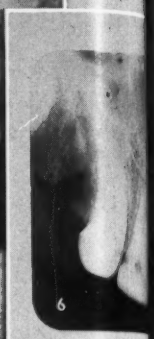
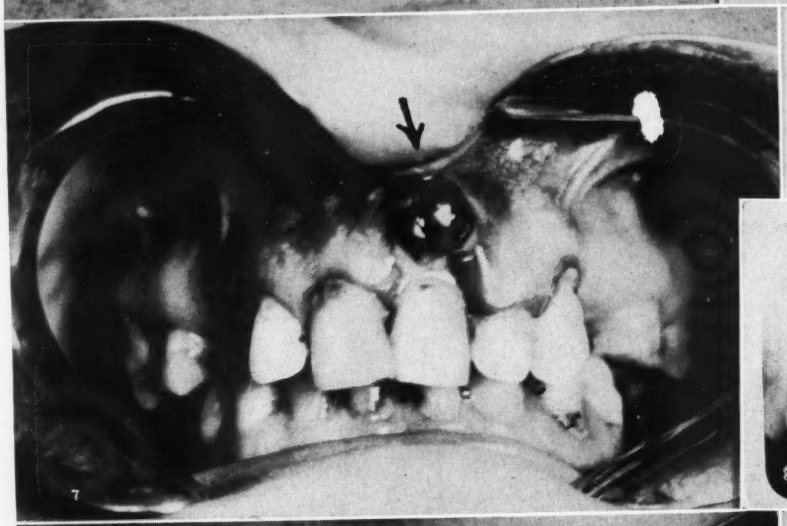
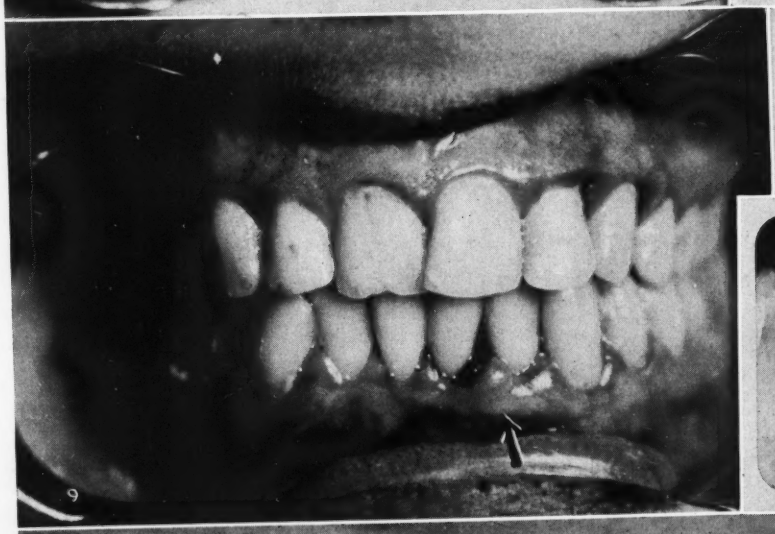








Differential Diagnosis Between Periapical and Periodontal Abscesses

MILTON HYMAN, D.D.S., New York

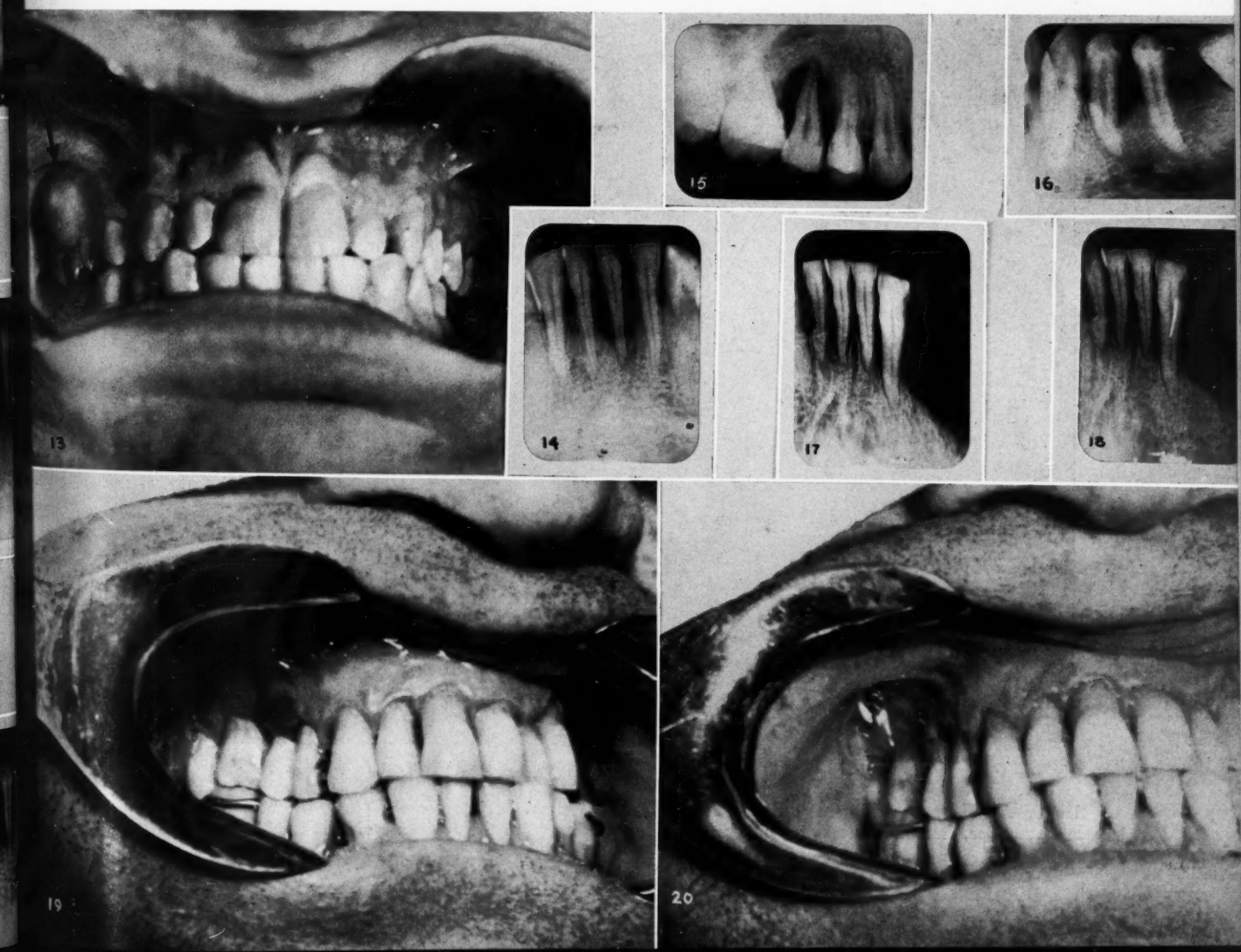
AUTHORITIES DIFFER AS to the terminology in abscess formation. For the sake of simplicity I shall refer to the periodontal abscess as one having its origin in the tissues surrounding the teeth. The periapical abscess has its origin in the septic contents of the pulp canal.

Periapical Abscess—The patient with a periapical abscess will present himself with a diffuse swelling well up in the muco-buccal fold (Figs. 2 and 5). The face may also be swollen (Figs. 1 and 4), and the lymph glands may be involved. There is generally a history of a toothache which subsided as the swelling developed.

A roentgenogram taken of a peri-

(*Text continued on next page*)

Fig. 1—Periapical abscess: external appearance. Note swelling of left side of face.
Fig. 2—Periapical abscess: same case as Fig. 1. The arrow points to the swelling in the muco buccal fold.
Fig. 3—Periapical abscess in same case shown in Figs. 1 and 2. The lingual root of the upper first molar is involved.
Fig. 4—Periapical abscess: external appearance. There was partial closure of the left eye because of swelling. To prevent identification the eyes could not be shown.
Fig. 5—Periapical abscess: same case as in Fig. 4. The swelling lies over the central and lateral.
Fig. 6—Periapical abscess: same case as in Figs. 4 and 5. Note absence of bone destruction about the apex of the central. The tooth was nonvital.
Fig. 7—Periodontal abscess. The swelling was present for one month. The tooth was vital, with the same reaction point as the other central.
Fig. 8—Periodontal abscess: same case as in Fig. 7.
Fig. 9—Periodontal abscess.
Fig. 10—Periodontal abscess: same case as in Fig. 9. Note bone destruction between the left central and lateral.
Fig. 11—Periodontal abscess of lower left central.
Fig. 12—Periodontal abscess: same case as in Fig. 11.
Fig. 13—Periodontal abscess upper right first molar.
Fig. 14—Periodontal abscess lower left central.
Fig. 15—Periodontal abscess upper left second bicuspid; the tooth was vital.
Fig. 16—Periodontal abscess lower right first biscuspid.
Fig. 17—Periodontal abscess lower right cuspid. Pocket lies to buccal of the root.
Fig. 18—Same case as in Fig. 17. A gutta-percha point has been inserted in the pocket to show its depth.
Fig. 19—Periodontal abscess upper right second bicuspid. (Courtesy of Doctor Samuel Charles Miller.)
Fig. 20—Same case as in Fig. 19 taken two weeks later. Conservative treatment had been instituted. (Courtesy of Doctor Samuel Charles Miller.)



apical abscess will disclose an area of rarefaction about the apex of the tooth in question (Fig. 3). There is one exception to this: an acute condition, which has been acute from the onset, may at first show no evidence of bone destruction (Fig. 6). In this event one must resort to the pulp vitality test for confirmation.

Periodontal Abscess—The periodontal abscess presents a clinical picture almost diametrically opposite to this. The swelling is not diffuse and rarely involves the face. It is confined to the gingiva propria (Figs. 7, 9, 11 and 13). There is no previous history of a toothache, such as evidenced in true pulp involvement; rather, one finds a pericementitis concurrent with the localized swelling.

The roentgenogram in the case of the periodontal abscess will vary with the location of the affected tooth. Single-rooted teeth (Figs. 8, 10, 12, 14, 15, and 16) disclose that type of rarefaction along the lateral aspect of the root known as "pocket formation." When this pocket lies directly to the buccal or lingual of the tooth, it will be superimposed on the tooth (Figs. 17 and 18) and will be detected roentgenographically only with difficulty. Here again one must resort to the pulp test. Roentgenograms of multirooted teeth may show this pocket formation along the root, or an area of rarefaction just below the bifurcation of the roots.

Importance of Vitality Test—Not all cases run true to form, and it may become necessary to rely on some further aid in diagnosis, and that aid may be found in the test for pulp vitality. It is axiomatic that a pulp with septic contents is nonvital; however, in the case of a periodontal abscess, the tooth gives a positive response. One should not infer from this that a tooth which has had its pulp removed may not be subject to a periodontal abscess. The roentgenographic and clinical observations should furnish enough clues to aid in establishing a definite diagnosis.

Prognosis and Treatment—On the whole the prognosis for a periapical abscess is decidedly unfavorable. In a few cases root therapy (followed by apicoectomy) can be instituted, but for the majority of cases extraction is the only cure. The prognosis for a periodontal abscess is usually favorable (Figs. 19 and 20). Curettage of the pocket and relief of the occlusion will bring about an abatement of the symptoms. Periodontal treatment should be instituted and the cause of the pocket formation removed.

It can readily be seen that the importance of a correct diagnosis is not merely a question for academic discussion. It has a practical bearing if one is to practice conservative dentistry.

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Pyorrhea Treatment by Electro-Incision

E. CHAPMAN, D.D.S., Minneapolis

THERE ARE three methods of using electric current in operating on diseases of the mouth: (1) desiccation, (2) coagulation, and (3) by incision or oscillating current. For several years I have been treating periodontal disease with the incision current and have eradicated pockets by operating from within the pocket itself, thus preserving the outer integrity of the tissue. I utilize the opening left by the gingival disease for the needle entry. The operation may be done without an anesthetic. If an anesthetic is used, infiltration is all that is necessary. This technique can be performed without hemorrhage.

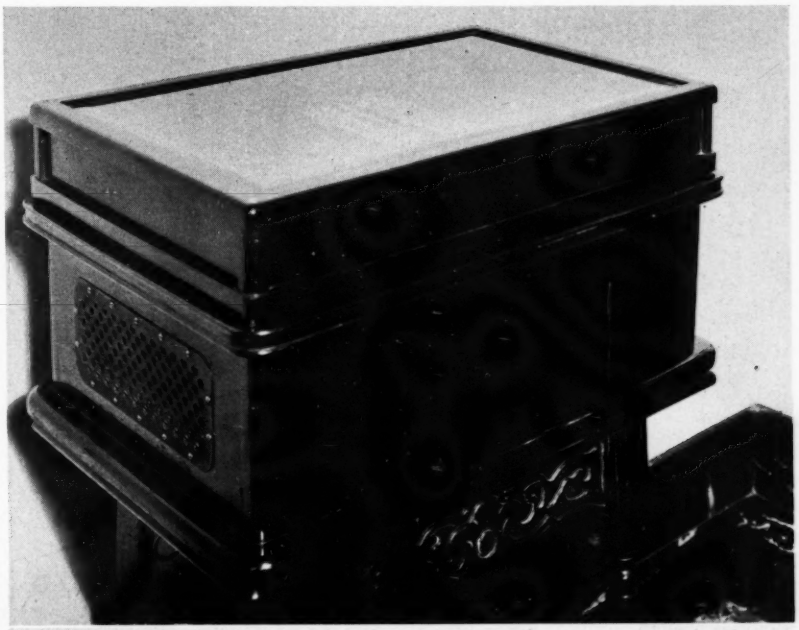
In addition to its use in periodontal surgery, this technique may be used in incising abscesses and to destroy hypertrophied tissue.

Formerly pyorrhea was treated merely by scaling or planing of root surfaces to remove calculus and débris; but the pocket remained. Later surgery was introduced; but this entailed the removal or stripping of good outer tissue in order to find access to the pocket. Good results in eliminating pyorrhea through surgery were possible only in the hands of well trained periodontists. Hemorrhage and destruction of tissue were still inevitable. Webb then introduced the double point coagulation technique. Access to the pocket was still from the outside.

The innovation in the technique presented here is the complete extirpation of the pocket from within the pocket itself. The advantages are (1) the preservation of good outer tissue; (2) elimination of infectious pocket contents; (3) shrinkage of the tissue to a well formed base and closure of the pocket; and (4) elimination of hemorrhage.

An aniline dye is used in Vincent's infection to stain the gingivae. This dye contains the following:

Crystal violet	1.0
Brilliant green	1.0
Ethyl alcohol	50.0
Distilled water	50.0



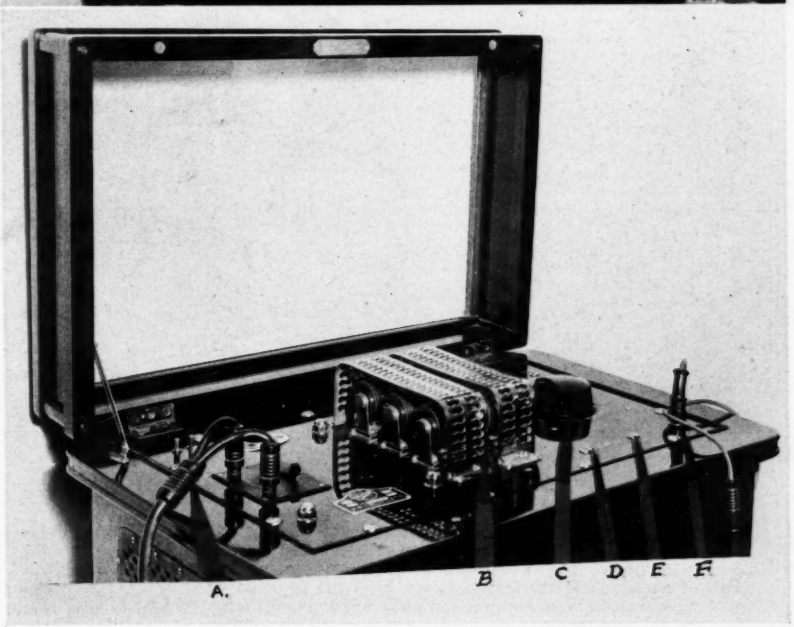


Fig. 1—(Top) Closed equipment case.
Fig. 2—(Bottom) Electric knife: A, foot control connection to produce and break the circuit. This must be synchronized with the electrothermic cutting arc. B, Spark gaps. To lessen coagulation, set close; to increase coagulation, open wider. C, Cutting current control radio dial increases or decreases oscillations. D, Light coagulation socket. E, Heavy coagulation socket. F, Knife socket for oscillations. The author has not used D or E coagulation sockets for five years. All operating has been done from the knife socket (F) with a fine needle point.

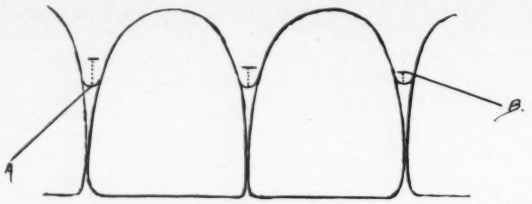


Fig. 3

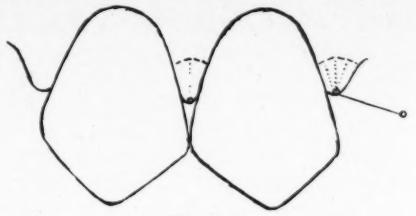


Fig. 4

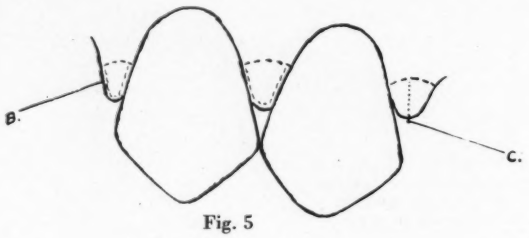


Fig. 5

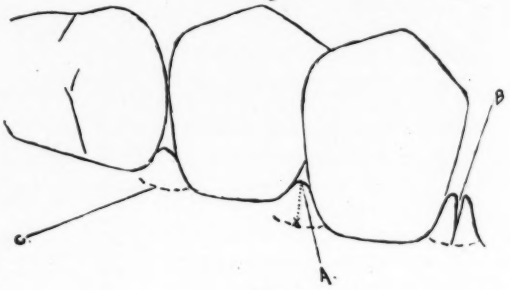


Fig. 6

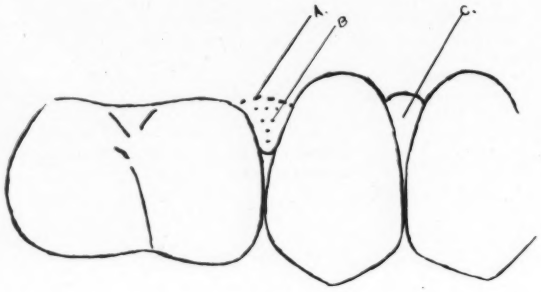


Fig. 7

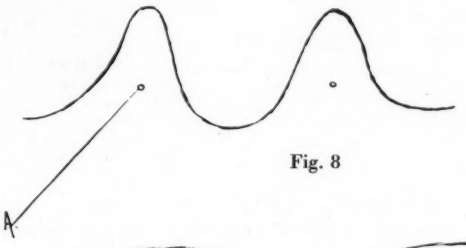


Fig. 8

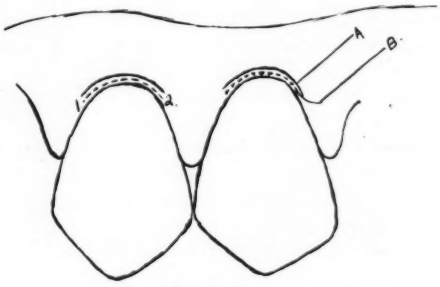


Fig. 10

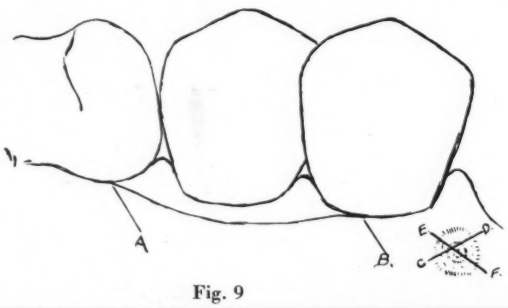


Fig. 9

Electro-Incision Technique

Fig. 3—Technique for gingivitis: Insert needle point at A. Plunge point quickly to apparent depth of inflammation at B. The insertion is made in between the lingual and labial gum tips of anteriors. If the inflammation is in the bicuspid or molar region the insertion is made at the inner side of the lingual gingiva and at the buccal tip; therefore, two insertions are made.

Fig. 4—Internal puncture of a typical pyorrhea pocket. Start the needle point at 0. Pierce to base of pyorrhea pocket. The dotted line represents the needle point path inside of the entire gingiva. This procedure is best repeated a month or so apart or at prophylactic intervals. It finally closes and eliminates the pocket. The needle should be kept well inside the gingiva to prevent wounding the outer tissue. Infection is eliminated and the diseased tissue is removed in one operation.

Sometimes additional steps are indicated in the technique:

1. A small amount of phenol sulphonic acid applied with a broach is held in the punctured area for one-half minute; then saturated solution of sodium bicarbonate is used to neutralize.

2. An application of ultraviolet rays from a water cooled lamp is recommended on the surrounding area. This promotes healing and comfort.

3. Ionization is occasionally employed with a 1 per cent solution of copper sulphate placed in the puncture left by the incision needle, or a 5 per cent solution of magnesium sulphate applied over the gums with a rubber cup electrode. The copper

sulphate solution is used to aid healing; the magnesium sulphate solution relieves swelling, pain, or pyorrheal inflammation.

The ionization machine used by the author consists of: a motor transformer, the motor being attached by an electric cord to a regulator which is placed on the operating table. The regulator has a button with a millimeter gauge on it to increase or decrease the current. A double cord extends from the regulator to the patient who holds a handle electrode. The other electrode carries the medication to the gum line with a copper needle on which has been wound cotton dipped in the sulphate solution; or, a rubber cup containing medication.

4. A saturated solution of iodine in beechwood creosote placed into the pierced area with a broach, then covered with a coat of saturated solution of tannic acid in glycerine will protect the medication from moisture.

(Steps 1, 3 and 4 represent separate treatments as indicated by the condition.)

Fig. 5—Vertical puncture with a needle. Needle enters gingiva at C; descends to base of pocket. With a quick-scooping movement the operator "scoops out" material from labial to lingual and from lingual to labial without wounding outer tissue. All the center material is thus removed. The same procedure is followed for the bicuspid and molar regions. Shrinkage occurs at once and the pocket is eliminated. This method is used when immediate results must be had. B, The dash lines, amount of bone destroyed; C, path in which technique is used.

Fig. 6—"Collapsing the pocket." This method is employed only in the bicuspid and molar regions when the pockets are deep and quick results must be had. Infiltration of the gingivae is used here. A represents the point at which the needle point is pierced quickly downward inside the pocket to reach the point X just above the pocket base. The point is swept quickly through the outer tissue producing a neat slit-open gingiva (B) without hemorrhage. C represents depth of alveolar pocket.

This method keeps all coagulatory and sterilizing action within the pocket and gives an opportunity to use compression packs. Packs should be used which remain plastic and can be wedged in the interproximal space and bear the slit tissue down toward the base of the pocket.

Fig. 7—"Slough piercing." (This is done from the outside—a variation.) In bicuspid and molar regions, several straight piercings (B) are made into the buccal and into the lingual gingivae clear through, and the pierced section sloughs out in a day or two (C) and leaves a well covered tissue edge. A shows the base of the pocket.

Fig. 8—A represents a small coagulation spot sometimes used as a "topical anesthesia" to overcome the prick of the hypodermic needle used for infiltration. It is done quickly by touching the gingiva with the direct point of the electric needle. Occasionally a sluggish, nonhealing gingiva with persistent bleeding is encountered after electrical operation. The treatment is to touch the gingiva with a little phenol sulphonic acid on a broach, neutralized in half a minute with sodium bicarbonate.

Fig. 9—Bloodless incision. A bloodless incision can be made by placing the needle point at A and with a quick sweep to B immediately removing the gum tips and the adjacent loose tissue to reduce the gum line to the base of a pyorrhea pocket. The criss-cross at the lower right side of Fig. 9 represents an incision made quickly with an electric needle to open a gum abscess for drainage. The needle point is placed at C and swept across to D. This is repeated from E to F. This full open incision is done quickly without an anesthetic and little discomfort to the patient.

Fig. 10—"Tracing away" of hypertrophied tissue. This is done when a bridge facing, which has become embedded at the gingiva, causes hypertrophy and inflammation. A represents such hypertrophied tissue from irritation by the edge of a porcelain facing. B, Dotted line, indicates where the needle point is swept gently from 1 to 2 between the facing and under the gum edge. This method removes tissue gently; leaves an invisible wound, and frees the impingement; moreover, an opening is not left between the facing and the gingiva. The coagulation of the incision current can be controlled to a line 0.1 mm. for depth.

This aniline dye preparation is intensely bactericidal; it is used also to make the tissue photosensitive to short waves of ultraviolet for which a water-cooled burner is used. The dye gives an optical contact and secures deeper penetration of the rays into the tissue. In connection with this, the needle piercing of the gingivae is done and the tissue scooped out as in Fig. 5.

1831 *Medical Arts Building.*

ANNOUNCEMENT OF BOOKS RECEIVED

A TEXT BOOK OF CLINICAL PERIODONTIA, A Study of the Causes and Pathology of Periodontal Disease and a Consideration of Its Treatment, By Paul R. Stillman, D.D.S. and John Oppie McCall, A.B., D.D.S., New Second Edition, Completely Revised and Reset, New York, The MacMillan Company, February, 1937.

WELLCOME PHOTOGRAPHIC EXPOSURE CALCULATOR, HANDBOOK AND DIARY, Revised Annual, 1937. Four editions are available for use in (1) Northern Hemisphere and Tropics; (2) Southern Hemisphere and Tropics; (3) Australasia and Tropics; (4) United States of America. New York, Burroughs Wellcome & Co. (U. S. A.), Inc., 1937.

Artificial Restoration of Gingival Tissues

PHILIP S. HALEY, D.D.S., San Francisco

THERE ARE SOME cases of advanced periodontitis in which the tissue destruction is so severe that the patient becomes painfully conscious of the unnatural appearance of his teeth and gums. Following treatment this appearance is usually aggravated rather than improved owing to the necessary removal of gum tissue.

The improvement in color which takes place is not sufficient to check the unsightly appearance; moreover the regeneration on the labial and buccal surfaces of the teeth does not proceed far enough, in some cases, to correct the appearance.

It is possible by the method herein outlined to produce an appliance which is easy to construct and which when in position in the mouth produces an effect comparable to a condensite restoration (Figs. 1, 2, 3, 4).

Technique

1. Two solutions are prepared. The first solution consists of any pink condensite material of suitable shade which is easily soluble in acetone. Some condensites are not fully and readily soluble, but require the addition of banana oil to the acetone for solution. Any of the thermoset or thermoplastic materials are satisfactory.

The solution may be made of any desired consistency. It is best to use one that is thick, of the consistency of thick whipping cream, perhaps, or somewhat thicker, but it should flow under the brush readily. It will resemble in color the material from which it is made.

The second is made exactly as the first, but is slightly less thick. It is then colored to a somewhat deeper shade of pink by the addition of small amounts of carbolfuchsin. One or two drops of the ordinary solutions used for staining bacteria will be found sufficient. This gives the solution required for coloring those parts of the appliance to be made deeper in shade than the parts that should be lighter. It thus permits a wider range in creative shading than would be the case if only the first solution were used.

2. An impression of the case is now taken and a model of stone or plaster is made. The model material between the teeth is cut into slightly in order to increase retention by the intrusion of the appliance into the interdental spaces.

3. Solution 1 is applied on a brush first dipped into acetone, allowed to dry and reapplied, the brush being used the second time without dipping in acetone. It is carefully worked into the interdental spaces, brought to the cervical level required, and as high above the lip line as desirable. Bubbles which may occur are removed by pressing back upon them. When sufficient thickness has been attained by repeated application, contour plumping is done as required.

Solution 2 is now used for shading. Areas higher toward the lip and reflection of the mucosa must be shaded slightly pinker; and likewise those between the roots of the teeth. A little practice will result in ready use of solutions and understanding of various details difficult to describe.

After coloring and contouring have been completed to the satisfaction of the operator the case should be given at least twenty-four hours in which to harden; however, while the appliance will then be ready for removal from the model, if it is left there another twenty-four hours, a nearly maximum shrinkage will have been obtained. This will enable the operator to estimate the thickness of the material. It will, of course, be apparent that the process of curing as within a flask is dispensed with by the method here described. The condensite is dried out of the acetone solution by evaporation; the factors of heat and pressure play no part.

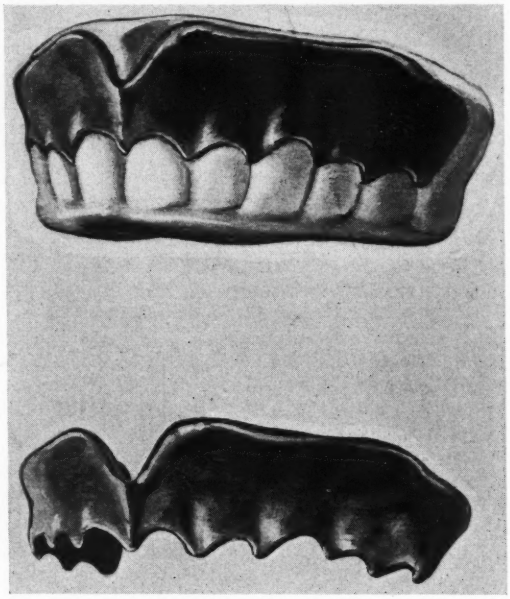


Fig. 1 (top)—Appliance on model.
Fig. 2 (bottom)—Appliance trimmed after removal from model.

Fig. 3 (top)—Recession after treatment.
Fig. 4 (bottom)—Appliance in place.

With a saw of thin blade and teeth sufficiently spaced so that the model material will not easily clog them, cuts are made into the model at angles and points of distance from one another which will facilitate their separation from one another with the minimum of strain upon the appliance. The case may now be soaked in cold water for five minutes, and the blocks of model removed by repeated gentle blows with a horn hammer.

When the appliance is separated from the model material, the inner surface may be cleaned with a rough scouring brush, dried and coated with a single application of acetone carrying a small amount of the first solution. This will glaze the side of the appliance nearest the gum tissues. A similar procedure will smooth the edges where they may be roughened.

Report of Case

The patient, a woman, aged 48, had been treated surgically a few years before examination. Centrals and laterals were mobile. Treatment by the phenol-pack method resulted in slight furtherance of labial recession and immobility of teeth. The appliance shown in the accompanying illustrations was made. The result showed a better lip contour and restoration of the gums. After the appliance was worn for about three months, the patient was still pleased. A slight increase in the sensitivity of the roots was overcome by use of cold water which was slightly alkalinized to assist in regaining pulp resistance to cold water and air. This increased sensitivity was noticed when the appliance was removed. The patient was advised to wear the appliance only during the day, removing it at times for rinsing with cold water.

210 *Post Street.*

ABOUT OUR CONTRIBUTORS

(*Continued from page* 117)

RUSSELL E. HUBER was graduated from the University of Dayton in 1930 with a B.S. degree and received his D.D.S. in 1932 from the University of Michigan. Doctor Huber is a member of the American Dental Association and component societies, and a member of the staff of Miami Valley Hospital where he interned from July, 1932 until June, 1934.

RALPH W. EDWARDS, D.D.S. (Kansas City-Western Dental College) has previously contributed two articles to the Dental Digest, the first, THE REMOVAL OF FRACTURED ROOTS APPROXIMATING THE MAXILLARY SINUS, appeared in March, 1936 and the second, PROSTHETIC CORRECTION OF A NASAL DEFORMITY last May.

FREDERICK H. DONER, D.D.S. (University of Pennsylvania, 1923) contributed an article on the semidirect Porcelain Jacket Crown in the May, 1936, issue of this magazine. His professional biography was given at that time.

What Twelve Hundred Patients Know About Dentistry*

PART III

6. *How Long Do You Expect Dental Work That Has Been Done (Fillings, Bridges, for Instance,) to Last?*—This might be called a catch question. It was intended to reflect a common point of view among dentists as well as among patients. Dentists often tell their patients in more or less definite terms how long a dental restoration can be expected to give service. Too often by inference or by direct statement, he leads the patient to believe that a dental restoration will last a lifetime. Although patients are aware that all mechanical or material articles are subject to wear and breakage and fashion and thus subject to repair and replacement, dentists inadvertently have given their patients the impression that dentistry is something that has a perpetual or prolonged life. Even the dental terminology is sometimes misleading to the patient. The dentist speaks, for example, of "fixed" bridges and "permanent" dentures. The result is that any failure of a dental appliance or restoration is regarded as defective dentistry. Dentists, throughout the years, have given patients a false reliance with respect to the life of a dental appliance. This may not have been conscious but even implied guarantees are dangerous. Dentists owe it to themselves and their patients to alter this misconception.

7. *What Relation Do the Teeth Have to General Health?*—Apparently patients are clearly aware of three relationships between the dental tissues and general health: It is recognized (1) that diseased teeth can be a cause of general ill health

*A study conducted by the Editorial Staff of THE DENTAL DIGEST in cooperation with thirty-seven practicing dentists whose names were listed in the January issue.

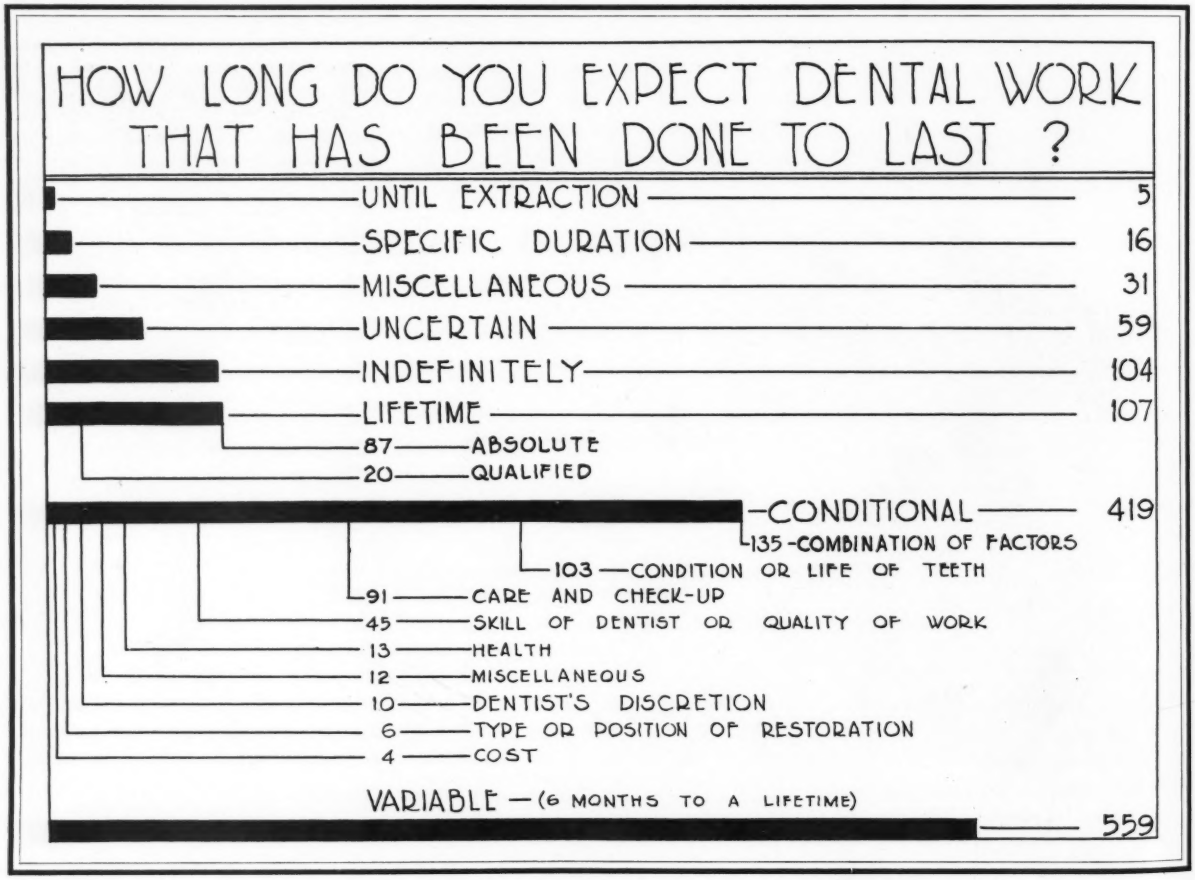


CHART 6

TABLE 6—HOW LONG DO YOU EXPECT DENTAL WORK THAT HAS BEEN DONE TO LAST? For Example: Fillings or Bridges

FIRST CLASSIFICATIONS: 165 **TOTAL REPLIES: 1300**

Sub-Classifications: 135

1. Variable According to Types of Restoration (6 months to a lifetime): 559

a. Gold Inlays: 47

Ten years, 2; Five years, 1; permanent, 9; indefinitely, 3; twenty years, 2; twenty-five at least, 2; twelve to fifteen, 1; twelve, 1; fifteen at least, 1; until new decay starts, 2; ten years to life, 10; ten to fifteen years, 2; fifteen to twenty, 10.

b. Bridges: 53

Indefinitely, 12; 10 to 15 years, 9; 6 months to 5 years, 1; lifetime, 9; until absorption calls for reconstruction, 1; 10 years, 2; 20 years, 2; until tooth it is attached to gives way, 3; until I get my false teeth, 1; 12 to 15 years, 1; not long if teeth nearest it decay, 1; 15 to 20 years, 2; 5 years, 4; 15 years, 1; need frequent adjustment, 1; permanent, 1; one year, 2.

c. Silver: 33

3 to 5 years, 4; 2 to 3 years, 4; 10 years, 4; 5 to 8 years, 2; 5 to 10 years, 2; indefinitely, 1; 2 to 7 years, 1; 4 to 6 years, 1; 2 to 10 years, 1; not reliable, 2; several, 4; 20 years or longer, 2; 3 or 4 years, 1; 8 to 10 years, 1; 2 years, 1; 6 months, 1; 5 years to life, 1.

d. General: 406

30 years, 2; 20 to 30 years, 3; 50 to 60 years, 1; 20 to 25 years, 4; 20 years, 15; 3 to 5 years, 7; 1 month to 3 years (from experience) 1; 15 to 25 or more, 2; 4 or 5 years, 4; about 3 years, 4; 10 to 20 years, 10; 6 years at least, 2; 1 year, 10; 5 to 10 years, 24; 10 to 15 years, 21; 15 years, 18; 40 years, 1; 2-3 years, 9; 2 years or longer, 10; 1-15 years, 2; 1-10 years, 2; 20 years barring accidents, 2; 3 years, 4; 5 years, 33; 5-15 years, 5; as long as the tooth, 3; 35-40 years if done between ages of 15 and 25 years, 1; small fillings, lifetime, 1; large fillings, 15-20 years, 1; 7 years or longer, 1; 25 years or more if done by a good dentist, 4; 6-8 years, 3; 4-8 years, 1; 6 or 7 years, 1; about 1½ years, 1; 3-10 years, reasonable, 2; 5-7 years, 3; 2 years, with care, 1; 6 months to 3 years, 1; 8-15 years, 1; ordinary fillings have to be built up after a year, 1; 10 years, at least, 97; 4 to 25 years, from experience, 1; about 6 years, 1; at least 3 years, 2; from experience, about 5 to 8 years, 1; I have had them about 30 years, 1; have had some for 20 years and expect them to last much longer, 1; 5 years, at least, 4; 6 months, 1; until new cavity on same tooth calls for an inlay, 1; 5-10 years for older people; younger ones longer, 1; 20 years, if good work, 4; 10 to 25 years, 1; about 4 years, 1; 15 or 20 years, 8; 5 or 6 years, 8; 4 years, 2; 7 to 10 years, 3; 8 to 10 years, 7; 6 to 10 years, 1; 2 to 10 years, 1; 20 to 25 years, 1; 6 to 15 years, 1; 11 to 13 years, 1; 3 to 6 years, 1; 12 to 15 from experience, 1; 25 years, at least, 1; 4 years to 6 years, 2; 3 to 4 years, 4; 5 to 20 years, 1; 20 years or more, I hope, 3; 7 to 8 years, 3; 1 year, at least, if a good filling, 1; 25 years, 4; 5 to 8 years, 3; about 2 years, at least, 1; 8 to 15 years, 1; at least 7 years, 1; 8 to 12 years, 1; 4 to 7 years, 1; about 20 years, 1; 1 to 5 years, 1; 2 to 10 years, 1; 10 or 12 years, 1; longer than does, 1.

e. Crowns: 4

I've had one 17 years, 1; 10 years, 3.

f. Porcelain: 16

1-2 years, 3; temporary, 3; 6 to 7 years, 1; 2 or 3 years, 1; 3 years, 1; 3 to 4 years, 1; a few years, 2; 5 years, 2; 2 years, 1; 4 to 7 years, 1.

2. Conditional: 419

a. Combination of Factors: 135

Depends on quality of work and material used and condition of patient's teeth, 71; depends on other conditions present, 37; depends on the dentist and materials used, 6; depends on teeth condition and efficiency of dental attention, 7; depends on your teeth and the ability of the dentist, 1; 10 or 15 years, unless the teeth go to pieces from bad health or diet or the calcium is drained from the system in pregnancy or nursing a baby. (I nursed a five month old baby through whooping cough and nearly ruined my teeth.) 1; a great deal depends on dentist's fitness and the care afterwards, 1; depends on quality of work and the abuse given it, 2; bridges, as long as supporting teeth, barring accidents, 1; depends on the doctor and the patient, 1; depends on age of patient and the reliability of dentist, 1; depends on the constitution of the person and the dentist who does the work, 1; many people do not realize that age and conditions govern this materially, 1; this depends entirely on the type of work, each of which must necessarily be given a different life expectancy. It also depends upon the degree of "health" of the tooth or teeth when the work was begun, 1; from experience, 5 to 10 years for fillings; bridges depend on care and attention given them, 1; I have no fixed time limit. Many things enter into the recurrence of tooth troubles, 1; depends on the kinds of fillings and care, 1.

b. Condition or Life of Teeth: 103

Depends on condition of teeth, 60; as long as the rest of the teeth stay well, 2; the life of the teeth, 29; expensive fillings should last the life of the tooth, 1; depends on condition of the mouth, 2; as long as the tooth, with proper care, 1; until other parts of the tooth give way, 1; as long as the tooth and fillings are firmly placed, 1; as long as the tooth to which it is fastened, 4; they should be made to last as long as the tooth is there, 1; as long as teeth and gums remain uninfected a bridge should last indefinitely. If a cavity appears around the edge, the work must be done over, 1.

c. Care and Check-Up: 91

Should be looked at every year, 2; reasonable length of time, if cared for properly, 16; indefinitely, if watched carefully, 41; should be looked after every six months, 5; depends on care given teeth, 25; they should last four or five years but it is necessary to check or change them every year, 1; depending on the care given teeth after the work has been finished and seeing your dentist regularly during the year, 1.

d. Skill of Dentist or Quality of Work: 45

Several, if properly done, 2; if done by a good dentist, indefinitely, 10; depends entirely on your dentist, 14; depends on how well a dentist knows his job, 16; depends on quality of work. I like to be examined every 6 months, 1; it all depends on the person performing this work. Reliable work should last indefinitely, 1; 5 to 10 years, depending on the work that has been done, 1.

e. Health: 13

Many years, if in good health, 3; depends on the amount of acid in the system, 2; depends on a person's state of health, 6; should last as long as teeth and gums are healthy and do not pain, 1; depends on the health of the individual, 1.

f. Miscellaneous: 12

Until they have to be replaced on account of decay, 3; indefinitely, if the tooth doesn't crumble or decay, 3; it is my experience that fillings last until the root becomes decayed, 1; as long as the root is sound, 1; depends on kind of foods eaten, 1; 10 or 15 years with careful eating, 1; should last years, barring breakage and accident, 1; would depend on anchorage or leverage; with these conditions normal, work should last years, 1.

g. Dentist's Discretion: 10

As long as the dentist tells you, 3; until my dentist tells me they should be changed, 1; I don't "expect"; I go to my dentist regularly and let him judge by his explorer and x-rays, 1; I don't *expect*; I go to what I consider a good dentist, and *trust*, 1; as long as you go to a dentist regularly, 1; one year if not examined, 1; I visit the dentist regularly to prevent trouble; have no definite expectations, 2.

h. Type or Position of Restoration: 6

Depends on type of restoration, 1; depends on type of filling, gold longer than silver or porcelain, 1; depends upon position of filling, 2; it depends on how the tooth has been filled on the teeth which the bridge has been connected, 1; 2 to10 years, depending on type of filling, 1.

i. Cost: 4

According to prices paid for work, 1; that depends on the price you paid for the work; 1; depends on the kind of work one can afford. For myself, indefinitely, 1; long enough to get my money's worth out of them, 1.

3. Lifetime: 107

a. Absolute: 87

A lifetime, 86; fillings, I expect to last all my life (I am 20 years old and have only two fillings, and don't expect to have any more): know nothing about bridges, 1.

b. Qualified: 20

Permanently; but I guess that is asking too much, 1; for years, sometimes a lifetime, 3; permanently, if done all right, 3; as long as the tooth; it should last a lifetime, 1; I hope it lasts as long as I do, 1; a lifetime,if it isn't necessary to kill the nerve, 1; under favorable conditions for life, 1; always, unless for some reason I need false teeth, 1; with proper care, a lifetime, 4; should last a lifetime with good care and periodical examinations, 2; forever, if you see your dentist twice a year or more, 1; fillings put in by a good dentist after a person is 25 years old should last a lifetime if the person cares for his teeth and has them x-rayed and checked annually, 1.

4. Indefinitely: 104

A number of years, 8; several years, 35; a long while if repaired in time, 6; a good long while, 5; no telling; one week to life, 3; indefinitely, 27; a long time, 1; good dental work should last a long time, 1; years, 1; much longer than they usually do, 1; no specific time, 1; many years unless the tooth becomes further affected, 1; I have some that have been in 15 years, 1; I have had the white front fillings in for twelve years, 1; no limited time, 1; six months to several years, 1; indefinitely if properly done, 1; variable, five years to a lifetime, 1; a long time, 1; indefinitely if teeth are in good condition, 1; just temporary, 1; indefinitely under normal conditions and care, 1; from observation only a few years, 1; several years unless an abscess develops under a tooth, 1; it all depends on the teeth; some people have the same fillings a lifetime, 1; a good while, 1.

5. Uncertain: 59

Do not know, 27; no answer, 27; no idea, 1; never gave it a thought, 1; no thought on it, 1; I can't answer this, even to my own satisfaction, 1; nobody knows this one; I won't make a guess, 1.

6. Miscellaneous: 31

Mine don't last, 2; as long as a healthy tooth could be expected to last, 9; depends on the person, 10; depends on what the dentist had to work on, 1; how far can a frog jump? 1; it all depends on how quickly action is taken when a tooth starts to ache, 1; I wouldn't expect my dentist to do a better job than God did, 1; for quite a long time; dentist's bills have to be paid and money is scarce, 1; silver fillings are a mere waste of suffering and money for the patient, but reverse English for the dentist who majors the silver suggestion, 1; we cannot expect a dentist to accomplish more than nature, 1; I have hopes, but no expectations, 1; if work is done correctly by "good dentist," fifteen years; not dental parlors, 1; at least as long as the guarantee, 1.

7. Specific Duration: 16

Ten years under favorable conditions, 1; good work on a person in good health, twenty years or more, 1; if work is properly done on sound teeth structure, twenty years, barring disintegration of tooth structure around filling, etc. 1; sixteen years, mine did, 1; usually about three years, then something happens, 1; one to ten years if tooth doesn't break, 1; they don't last. Hope springs eternal, but time seems to average five to seven years; a fair average should be twelve to fifteen years, 1; eight to fifteen years or until evidence of leaks, 1; all the way from a few to twenty, 1; five to fifteen years, depending on the type of dental work, 1; eight to ten years if the proper work has been done, 1; good work, twenty years; the other kind, three years, 1; conservatively speaking, one to two years, 1; five to ten years, depending upon individual's attitude to care of teeth, 1; six months to twenty years, depending on hardness of teeth and general health, 1; twenty-five years average for fillings; fifty years for a bridge, 1.

8. Until Extraction: 5

Until you have to pull them out, 2; until general conditions of the tooth require extraction, 1; until I have all my teeth pulled, 1; until it is time for me to have false teeth, 1.

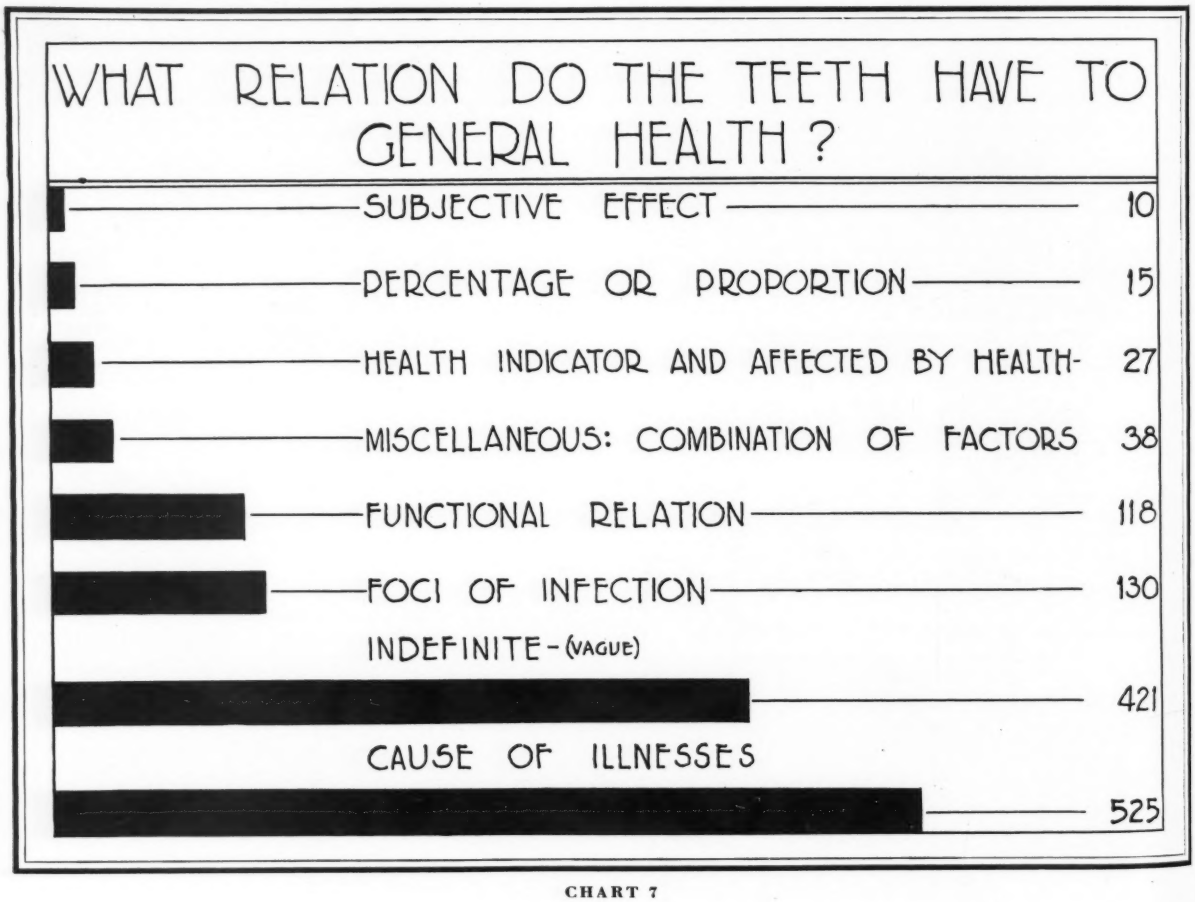


CHART 7

TABLE 7—WHAT RELATION DO THE TEETH HAVE TO GENERAL HEALTH?

ORIGINAL CLASSIFICATIONS: 174 TOTAL REPLIES: 1284

1. Cause of Illnesses: 525

Cause of diseases, 11; diseased teeth impair general health, 175; loss of weight, 2; sound teeth essential to good health, 149; source of much illness, 86; lowers resistance, 4; rheumatism, 29; deafness, 2; heart trouble, 10; headaches, 6; gland infection, 1; neuralgia, 3; kidney trouble, 1; eye trouble, 1; stomach trouble, 5; arthritis, 1; sinus, 1; run down nerves, 8; upset stomach, head, and eyes, 1; contribute to systemic order or disorder, 2; an abscessed tooth may cause tuberculosis, 1; less headaches and you can gain in weight, 1; can cause bad eyes, 1; constant swallowing of decayed food particles and pus from teeth results in bodily ailments, 1; poor teeth cause earaches, 1; keeps one's stomach in good condition, 1; bad teeth may cause sinus trouble, 1; good healthy teeth will not cause trouble, 1; good mastication essential to good digestion—diseased gums and roots disastrous to health, 1; health isn't affected by sound teeth, but it may be by diseased or dead ones, 1; a person bothered with bad teeth will always have a sickness of some kind, 1; can affect whole nervous and blood system, 1; chewing of food is vital to good health, 3; much trouble can be traced to neglected teeth, 2; so great that we cannot have good general health and at the same time have healthy teeth, 1; dead teeth can cause trouble, 1; they help keep you well, 1; bad teeth ruin health, 1; a single bad tooth can tear down an otherwise healthy body, 1; the better the teeth the less trouble one has, 1; good teeth eliminate many ills, 1; condition of teeth is controlling factor of health, 1; almost any part of the body may suffer from neglected teeth, 1; they affect the whole system, 1.

2. Indefinite (vague): 421

A lot, 75; a close relationship, 181; important, 56; no answer, 56; poor, 1; yes, 1; necessary, 2; do not know, 5; when eating food when teeth are in bad condition, 1; if we don't have them we couldn't get along, 1; a vital importance, 2; controlling factor, 2; as important as the food I eat or the water I drink, 1; same relation as eyes have to sight, 1; foundation 1; everything, 23; they are Commander-In-Chief, 1; plenty, 1; means of keeping the system clear of poison, 1; all in the world, 1; about everything, 1; it all depends, 1; a great deal more than the average person may think, 1; they are at the head of the list, 1; bad, 1; bad teeth can be as disastrous as T.B.; good teeth are a blessing, 1; everything—a deformed mouth is like a deformed leg, 1; the same as a submarine to an enemy battleship, 1.

3. Foci of Infection: 130

Pus and poison in system cause disease, 58; any irregularity acts as a focus of infection, 10; bacterial poisons absorbed, 2; source of infection, 8; infect blood stream, 8; infected teeth cause kidney ailments, 1; bring poison into the body, 28; very much if there is pus formation, 1; poisons cause illness at point of least resistance, 1; poor teeth poison the food we chew, 2; bad teeth may poison any organ of the body, 1; germs don't spread in a clean mouth, 1; pus pockets at roots often cause trouble but if general health is good the system can generally take care of the poison, 1; carious teeth are foci for infections which have many manifestations, 1; it throws infection in the body, 2; imbedded in vascular gums which absorb poison or infection unless they are in a healthy condition, 1; they can cause pains in legs and arms, 1; good teeth keep the system free from poison, 1; teeth are one of the main sources of foci of infection, 1; they are the cause of manifestations; I mean they are foci of infection, 1.

4. Functional Relation: 118

Aid in mastication of foods, 38; first step in digestion of food, 48; bad teeth prevent proper mastication of food, 17; chewing of food is vital to good health, 3; poor mastication may affect digestive system, 2; important bearing on whole bodily functions, 1; with good teeth one can enjoy chewing food better, 1; hard to eat without teeth and can't live without food, 1; just like a machine—when one part isn't working, the rest don't work, 1; we cannot eat because our teeth hurt, 1; all the body processes are directly or indirectly related to the condition of the teeth, 1; mastication of food necessary to health, 1; necessary for thorough grinding of food, 1; they prepare food for mixing with saliva, 1; properly masticated food is one of the first aids to health, 1.

5. Miscellaneous: Combination of Factors: 31

Life span depends on dental care, 1; all have been extracted and did not correct any of the trouble, 1; as important as any other organs of the body, 4; the same as tonsils and adenoids, 1; cause of bad breath, 5; no one can be healthy, free from poison of some kind unless they have good teeth and take care of them—their own or "store teeth," 1; more than we are apt to realize since they prepare the food for absorption by the body and any infection is readily carried into the stomach or sent directly into the blood stream, 1; a great deal—if diseased, a focus for infection; if malocclusion, mastication is not good, 1; close, from digestive and infectious standpoint, 1; important because of absorption of the blood, 1; teeth in poor condition act as a degeneration of energy necessary for healthful physical energy, 1; keep them taken care of, 1; if they are decayed they give off gas, 1; the same as any other organ, 2; one causes the other, 5; healthy mouth promotes mastication—festered teeth can slowly poison victim, 1; infection in nerves can spread to other parts of the body; we need teeth to chew food for good digestion, 1; they affect each other, 1; we can't have good teeth without good health and vice versa, 1.

6. Health Indicator and Affected by Health: 27

All pains originate in teeth, 1; illness causes tooth decay, 11; are an indication of general health, 4; healthy strong people usually have good teeth, 1; indicative of state of person's health, 3; health sometimes affects the development of teeth in children, 1; the teeth are as a barometer of one's health, 1; poor teeth as indication to poor health; well kept mouth generally indicates a well kept body, 1; they may make the difference between a sick person and a well one, 1; if your teeth are healthy, you need not worry about your health, 1; general health may affect teeth as to ability to withstand decay, 1; if you are in good health, teeth are better as a rule, 1.

7. Percentage of Proportion: 15

75 per cent, 2; two-thirds of sickness from bad teeth, 1; more than we yet know, 1; about 50 per cent as much as some specialists would have you believe, 1; 60 to 80 per cent, 1; about 60 per cent, I should say, 1; I would say, 60 per cent, 1; 50 per cent of human ailments are caused by bad teeth, 1; I would say about half, 1; 92 per cent of all sickness begins in the mouth, 1; A great percentage of ailments could be avoided if proper care and attention were given to teeth, 1; a major contribution to good health, 1; negligible, 1; fair, 1.

8. Subjective Effect: 10

Decayed and dirty teeth cause a person to feel sick, 1; if your teeth hurt, you hurt all over, 1; affects mental and nervous condition, 3; pain in the teeth seems to affect entire body, 1; when my teeth are in good condition, I feel in fine spirit, 1; condition of one's teeth has a marked effect on one's disposition, 1; if your teeth are bad you feel bad all over, 1; a person doesn't feel so well when teeth are bothering them, 1.

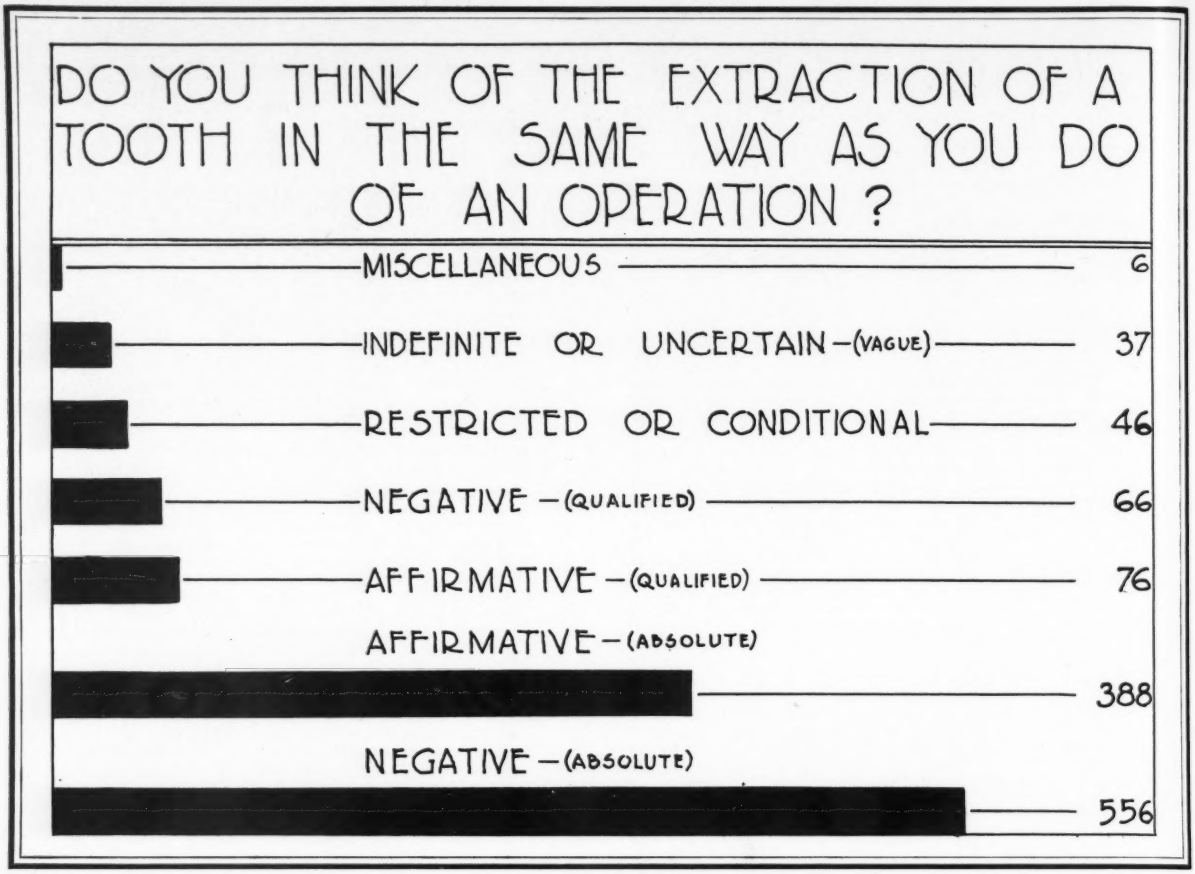


CHART 8

TABLE 8—DO YOU THINK OF THE EXTRACTION OF A TOOTH IN THE SAME WAY AS YOU DO AN OPERATION?

ORIGINAL CLASSIFICATIONS: 184 **TOTAL REPLIES: 1175**

1. **Negative (Absolute): 556**

No. 492; not as serious as an operation, 25; no, with proper local anesthetic it is no ordeal at all, 1; no, something like trimming my fingernails, 1; hardly, modern dental methods reduce extraction to the category of a pleasant pastime, 1; no, but you miss every tooth that you lose, 1; no, as there is no cutting like an operation, 1; no, because you can have it replaced, 1; no, the nerves are not being cut, 1; no, and if you think that they will hurt worse, 1; no, because it is all over in a short while, 1; no, because it is practically painless after extraction, 1; no, some extractions are worse than minor operations, 1; no, it seems to be a rather simple but very obnoxious procedure to be avoided if possible, 1; no, it is safer to have a tooth pulled than to have an operation, 1; no, not as dangerous, 3; no, but I don't care for the sore jaw afterwards, 1; no, I don't mind at all to have a tooth pulled, 1; no, but I hate awfully to give up a tooth, 1; no, I say, "just pull it out," 1; no, there is no after effect from extraction, 1; no, you get neither sympathy or rest, 1; naturally, no; however, neither is pleasant, 1; no, but a tooth is very important and should be saved, if possible, 1; no, but hate to lose a tooth more than I would an appendix, 1; no, I would not fear it, 1; no, it is only a flesh wound, 1; no, one is able to go home and take care of themselves in a short time, 1; no, an extraction is a painful necessity but nothing to fear, 1; no, because when astrological conditions are favorable an operation can be a success, 1; no, the atmosphere is not at all similar, 1; with confidence in my dentist, I have no dread of extraction, 1; don't dread the actual extraction; should hate to lose the tooth, 1; no, because of the frequency of extractions, 1; no, an operation to my mind is of much wider scope, 1; no, because it takes shorter time, needs only a local anesthetic, no bad after effects, done in the office, 1; no, thanks to dental surgery, 1; no, not as bad; don't die; aren't in a hospital overnight. I'd rather have a tooth out than be vaccinated for smallpox, 1; no, not as bad, 1.

2. **Affirmative (Absolute): 388**

Yes, 289; an extraction is a minor operation, 9; should be just as serious, important, 3; yes, minor operation, 40; yes, if it is pulled, and also the process of drilling, 1; yes, it is something lost, not to be regained, 6; yes, worse, 3; yes, because the roots are so firmly embedded in the jaw, 1; nature will heal an operation but will not replace a tooth that has been pulled, 1; sometimes I think it is worse, 1; I would dread it as much, 1; yes, and therefore I like to take gas, 1; yes, anything on the head to me is serious, 1; yes, it is usually the result of an acute condition and it takes several days to recover, 1; it is a shock to the system as an operation, 1; yes, complications may be just as dangerous, 4; yes, I have a positive horror of extractions, 1; yes, both need post-operative care, 2; yes, it should be done by a reliable dentist, 1; yes, because the ears, eyes, nose,

nerves, etc. are all involved, 1; yes, one is surgery of the bone and the other flesh, 1; yes, because it has to do with your health, 1; yes, it exposes the blood stream to infection, 2; yes, especially wisdom teeth, 1; yes, it's the last resort, 1; yes, more germs go into mouth than any other part of the body; it is harder to keep clean, 1; yes, it is the removal of a poisonous or useless part of the body and should be given equal precaution, 1; just about as bad, 1; yes, because each time you lose a tooth you lose a certain part of the body machine that helps to carry on the bodily functions, 1; yes, one could suffer from bleeding, 1; yes, once a tooth is lost, one realizes the importance of saving the rest, 1; yes, it requires thought and skill, 1; yes, I believe I have lost a very precious part of my body, 1; yes, a tooth is only extracted as a last resort, 1; it needs as careful care during and after, 1; one is as important as the other, 1; yes, the relation of the extracted tooth to the rest of the oral group and to the bodily health, should make it as important as an operation, 1; yes, and how! 1; I do now, but once I didn't, 1.

3. **Affirmative (Qualified): 76**

Sometimes, 19; somewhat similar, 19; not quite as unattractive, 1; body, I believe, is more dreaded, 1; only that it should be done carefully, 3; just as necessary but not usually as dangerous, 2; more or less, 3; just as serious but not quite as vital, 1; everything should be sterilized; i.e., tools, 1; extraction of an abscessed tooth is a major operation, 1; yes, only less serious and shorter recuperation time, 1; yes, it should be done in a sanitary way, 5; yes, if gas is taken, because the same things can set in, 1; yes, except not affecting system as generally, 1; I do not regard it as nearly so serious but as more horrible, nothing else is *pulled* out, 1; same danger of infection, shock, or hemorrhage, 1; in a mild way, 1; yes, in one way for if you let your teeth go you will have no more teeth and it will soon be too late to fix them; if you let a sickness go it will soon be too late to mend, 1; both should be performed by specialists, 1; yes, in some ways; however, I don't think it is quite as dangerous, 1; yes, we must guard against colds and infection, 1; sufficiently so as to demand the services of a skilled dental surgeon, 1; it is about as bad as an operation, 1; I think it bad enough, 1; more serious than removal of tonsils, etc., 1; having had both, I feel teeth are quite important, 1; to some it is almost as painful, 1; just about the same; only hope for not as bad after effects, 1; yes, because the nerves are affected, 1; not quite as serious; though by all means have a specialist for extraction, 1; almost, 1.

4. **Negative (Qualified): 66**

Not necessarily, 9; extracting isn't much worse than cutting a finger, 1; no, unless several are extracted at the same time, 2; no, but I should I guess, 2; not exactly, 11; extraction is much less serious, 2; not quite, 9; not always, 4; no need of that much alarm, 1; no, but probably should; guess we have so many teeth that one less does not seem to bother, 1; hardly, it is far too old a practice and attended by too little ceremony, 1; no, unless a part of the bone has to be taken, 1; I dread having a tooth pulled but it is nothing like an operation, 1; not as a major operation, but we should be sure it is necessary before losing the tooth, 1; not for myself, but I know cases where the bill was equal to that of a major operation, 1; no, I do not; to me an operation requires the knife; however, it is dangerous and the complications can be serious, 1; no, although it must be one, 1; not quite; unless it is a most complicated extraction, 1; no, it doesn't seem as serious because a general anesthetic isn't usually given, 1; not unless the extraction involves cutting into the jawbone, 1; no, I consider extraction of a tooth as a minor operation which will produce no pain before or after, 1; no, but perhaps it means as much or more, 1; no, though the outcome may be similar in effect of health, 1; no, that is, if x-rayed first and extracted by a reputable dentist, 1; no, but one should, 1; no, but I know that it is a form of surgery, 1; no, still I get the jitters, 1; no, not in my experience, 1; no, even though it is minor surgery, it is so painless in most cases that I would not class it in that way, 1; no, but it depends on skill, 1; no, not in a sense; but the after effects sometimes from an extraction prove to be as uncomfortable as the after effects of an operation, 1; I do not, if not neglected too long, 1; no, not entirely, but close attention and care should be exercised, 1; since my last extraction, no; tooth extraction has been reduced to a science and the layman need not fear it any longer, 1.

5. **Restricted or Conditional: 46**

Impacted teeth only, 16; in adults when tooth is infected, yes, 1; depends on the tooth, 3; my impactions were worse, 1; if it is a wisdom tooth it is fairly serious, 1; not for a single tooth—for a mouthful, yes, 1; to a certain extent, 3; depends on the kind of an operation —I have two to come out that I *dread*, 1; not unless it has to be cut out, 1; only in cases of impacted wisdom teeth, 3; depends on location of tooth and whether proper technique is used, 1; not if a dentist understands his business, 2; not unless an operation is necessary to extract it, 1; only in so far as cleanliness is concerned, 1; depends on condition of tooth at time of extraction, 2; depends on tooth to be extracted, 1; not unless the tooth is abscessed, 1; it sometimes depends on the condition of the gums, 1; yes, if it is a molar tooth, 1; depends on age; if under 30, no; older, yes, 1; if it is infected, 1; if the question pertains to *fear*, the answer is no, 1; depends on the condition of the tooth and location in the gums, 1.

6. **Indefinite or Uncertain: 37**

No answer, 22; do not know—never had either, 2; when tooth is dead, it should be extracted, 1; I insist on a specialist if that is what you mean, 1; do not know, 5; not yet, I haven't, 1; yes, as an ant to an elephant, 1; I am told it is—but had never thought so, 1; no, but perhaps it means as much or more, 1; in either case, you may lose your tooth, 1; never had an operation but do not dread extraction, 1.

7. **Miscellaneous: 6**

Technically, yes; practically no, 2; I believe in doing either if necessary, 1; it is more simple, although as painful, 1; not necessarily, although it might be called a minor operation; no, where pain is concerned; yes, as to asepsis, 1; no, as regards fear or dread of it—yes, in so far as it may mean health improvement, 1.

because of infection; (2) that the loss of teeth and consequently the loss of masticatory function can be a cause of ill health; (3) that the teeth can be influenced by the condition of health. The patient understands that diseased teeth can be the result of ill health as well as ill health the result of diseased teeth. In general, it may be concluded that the health significance of dentistry is generally accepted and appreciated. In the patient's mind, at least, the mouth is regarded as an integral part of the body. The public seems ready to accept the health story of dentistry.

8. *Do You Think of an Extraction of a Tooth in the Same Way As You Do of an Operation*?—The number of patients who did not consider the extraction of a tooth as an operation was greater than the number who did consider it as an operation. It must be remembered that dentists themselves, despite frequent and severe complications incident to extraction, still consider tooth removal as a casual procedure. The casual behavior of the dentist has at times given the patient a false assurance of safety. We would decry any attempts at over-dramatization of tooth removal or any over-expression of its dangers or hazards. If, however, dental extraction is to be done under accepted surgical conditions, precautions are in order and the public should be taught the value and importance of such procedures.

The general press treats accidents following tooth extraction and deaths in dental chairs as news. This is because in the eyes of newspaper men and the public alike the dental operation is no operation at all, and consequently no accidents or deaths should ever result. The attitude of the public toward operations on dental tissues represents a case of under-emphasis on the part of the profession.

(End of Third Installment)

Effect of High-Altitude Flying on Human Teeth and Restorations*

HARRY G. ARMSTRONG, M.D.** and RUSSELL E. HUBER, D.D.S., DAYTON, OHIO

IN RECENT YEARS there has been a growing conviction among aviators that flight at high altitudes and the use of oxygen have a detrimental effect on teeth and dental restorations. A preliminary study of this problem shows that two types of effects are most frequently complained of: one, a loss of dental restorations at high altitude; the other, a deterioration of the teeth and the loss of dental restorations approximately six months after a series of high-altitude flights.

Whereas the lay press has made frequent references to the effect of high-altitude flying on teeth, the medical literature contains only one reference of this kind: Koelsch[1] states:

Local cooling due to breathing cold air or oxygen may cause loss of fillings from the teeth due to the difference in expansion between the filling material and tooth substance. This phenomenon may also cause fissures between teeth and fillings in which bacteria may lodge and cause trouble.

Theoretical Considerations

The teeth are normally subjected to three distinct abnormal variations in environment during high-altitude flights: (1) decreased barometric pressures, (2) increased oxygen percentages, and (3) lowered atmospheric temperatures. If the teeth or dental restorations are affected by high-altitude flying, it is obvious that the effect must be due to one or a combination of these three factors.

The decrease of barometric pressure that occurs in altitude flights depends directly on the altitude attained. The highest altitude ever reached by man in an unsealed cockpit was 47,400 feet which corresponds to a decrease of barometric pressure of 12.7 pounds per square inch. The usual altitude flight probably averages about 18,000 feet which corresponds to a decrease of barometric pressure of 7.3 pounds per square inch. Since the decrease of barometric pressure on the inside of the body always corresponds to the decrease of the atmospheric pressure on the outside of the body, it is not possible that this change could have any harmful effect on teeth or dental restorations except in the case of a defective filling which enclosed an air space. Even in this event a simple calculation will show that with an ascent to 47,000 feet with a defective filling covering an air space one-eighth inch square, this would produce a pressure on the restoration and tooth of only 3.18 ounces which would not be sufficient to affect any otherwise well prepared restorations.

An increase of oxygen percentage in the inhaled atmosphere could only produce a deleterious effect through an oxidation of the tooth substance or dental restoration material. Since dental enamel and dental materials are chemically inert and not readily oxidized, especially at low temperatures, this possibility may be dismissed without further comment.

The low temperatures which occur in the mouth in high-altitude flights are due principally to the inhalation of cold oxygen. The degree of cold attained is limited by the ability of the aviators to withstand the discomfort produced.

It was determined experimentally that a stream of oxygen at 0°F. taken into the mouth through a tube could be tolerated for only five minutes; at —20°F. for one minute, and at —60°F. produced a frost bite of the mucous membrane of the mouth almost instantaneously. From this it may be assumed that regardless of the tem-

TABLE 1—*The Coefficient of Expansion of Human Teeth and Dental Filling Material.*

Material	Coefficient of Expansion
Dental cement	6.4 x 10—⁶
Amalgam	24.5 x 10—⁶
Porcelain	7.5 x 10—⁶
Gold	14.3 x 10—⁶
Human tooth (across occlusal surface)	9.3 x 10—⁶

TABLE 2—*Degree and Duration of Decreased Barometric Pressures Applied to Experimental Teeth.*

Number of Runs	Altitude (Simulated) Reached	Time at Altitude Each Run	Results
10	18000 feet	1 hour	None
10	27500 feet	1 hour	None
10	33000 feet	1 hour	None
5	15000 feet	1 hour	None
10	25000 feet	1 hour	None
5	30000 feet	1 hour	None
5	35000 feet	1 hour	None
10	40000 feet	1 hour	None

TABLE 3—*Exposure of Teeth to Pure Oxygen.*

Runs	Time of Each Exposure	Results
144	1 hour	None

*From the Physiological Research Laboratory of the United States Air Corps.

**Captain, Medical Corps, United States Army; Director, Physiological Research Laboratory, Materiel Division, Wright Field.

[1]Koelsch, Franz: Handb. d. Berufskrankh., First Edition, Verlag Gustav Fischer, Jena, 1935.

perature of the oxygen supply (liquid O_2 —183°C.) or the distributing system, temperatures in the mouth below 0°F. can never be tolerated for any considerable period of time.

Any effect of low temperatures on teeth and dental restorations must be due to a contraction or expansion with changes of temperature. This is well explained by McGhee[2] who states: For example, the case of a cavity and filling 1 cm. in diameter undergoing a temperature variation of 50° C. is cited in the report in Technologic Paper Number 157 of the Bureau of Standards. The free expansion along each coordinate axis is 4 microns for the cavity, 7 microns for a gold filling, and 12.5 microns for an amalgam filling. If the dimension or temperature range is less, the effect will be reduced proportionately. If there is a perfect adaptation of the filling to the cavity walls and no stress at the lower temperature, then at the higher temperature there are, quoting from the aforementioned report, two possibilities: (1) The elasticity of the tooth and compressibility of the filling may be such that perfect adaptation is maintained or (2) the rigidity of the tooth and plasticity of the material may be such that there will be a flow of material in the only free direction, causing a spheroiding or bulging over the cavity. With a perfectly rigid tooth cavity, this may equal three times the linear differential expansion of the substances, which will be 25 microns in the case of amalgams. Should the filling material take a permanent set at the higher temperature, then on returning to the lower temperature, all materials having undergone free contraction, there is a possibility of a 4 micron separation around the filling.

Experimental Procedure

This study included a clinical and an experimental laboratory investigation.

For the clinical study, ten United States Army Air Corps pilots and observers were selected. The basis of the selection was the maximum amount of flying time at high altitude which had been accomplished during their service and in the case of five of them, the anticipation of considerable high-altitude flying during a seven months' period of further observation.

Records were made of the total flying time that had been accomplished above 10,000 feet and the number of hours oxygen had been used in each case. A dental examination was given each subject and the observations recorded. Five of the original pilots and observers then kept an accurate record of all flights at high altitude over a period of seven months after which the dental examination was repeated and any changes in the condition of the teeth and dental restorations noted.

For the experimental laboratory investigation fifteen freshly extracted vital molars were used. They were carefully selected for absence of flaws or defects and for similarity in size and shape. Throughout the period of the study these teeth were kept continuously in warm physiologic solution of sodium chloride. The fifteen teeth were divided into three sets of five each. The first set was used as a normal control; the second set was used as control for restorations, and the third set for the experimental tests. Similar cavities were prepared in each pair of teeth in the latter two sets and one tooth from each set restored with one of the following materials: dental cement, gold, amalgam, amalgam set in cement, and dental porcelain.

A small bar one-sixteenth by one-half inch of each of the different dental materials used was prepared and these with four of the molars were measured to determine their coefficients of expansion. For this measurement a Zeiss Universal Measuring Machine having a tolerance of .00002 inch, was utilized at a temperature of 21.1° C. and 10° C. The coefficients of expansion as determined by these measurements are shown in Table 1.

Before the experimental procedures were initiated, photomicrographs were made of all the teeth to disclose any microscopic flaws, enamel cracks, fissures or restoration defects, and also to provide a permanent record of the original condition of the tooth substance and the restorations.

The five experimental teeth, each containing a different type of dental restoration, were then exposed to the following tests:

1. Barometric pressure reductions as shown in Table 2.
2. Exposure to an atmosphere of pure oxygen shown in Table 3.
3. Exposure to a current of cold

[2]McGhee, W. H. O.: Text-Book of Operative Dentistry, P. Blakiston's Son & Co., 1930.

TABLE 4—*Exposure of Teeth to Cold Temperatures.*

Number of Runs	Time of Each Exposure	Temperature °F.	Results
10	30 minutes	0	None
10	1 hour	−20	None
10	30 minutes	−40	None
10	1 hour	−60	None

TABLE 5—*Exposure of Teeth to Decreased Barometric Pressure, Pure Oxygen and Cold Temperatures.*

Number of Runs	Altitude (Simulated) in Feet	Temperature °F.	Oxygen %	Exposure Time	Results
5	10000	0	99	1 hour	None
5	15000	0	99	1 hour	None
10	20000	−20	99	1 hour	None
10	25000	0	99	30 minutes	None
5	30000	−20	99	30 minutes	None
10	35000	0	99	30 minutes	None
5	40000	0	99	30 minutes	None
10	40000	−20	99	30 minutes	None

TABLE 6—*Compression of Control and Experimental Set of Human Teeth.*

Tooth	Type of Restoration	Results
Control 1	Dental cement	Mounting failed at 2500 pounds
Control 2	Amalgam	Mounting failed at 1450 pounds
Control 3	Amalgam in cement	Mounting failed at 3500 pounds
Control 4	Porcelain	Mounting failed at 3000 pounds
Control 5	Gold	Mounting failed at 3500 pounds
Experimental 1	Dental cement	Mounting failed at 3000 pounds
Experimental 2	Amalgam	Mounting failed at 3600 pounds
Experimental 3	Amalgam in cement	Mounting failed at 3400 pounds
Experimental 4	Porcelain	Mounting failed at 2600 pounds
Experimental 5	Gold	Mounting failed at 3200 pounds

atmospheric air as shown in Table 4.

4. Exposure to decreased barometric pressures, increased oxygen percentages and cold temperatures as shown in Table 5.

For these tests, the experimental teeth were mounted in a piece of cork one-half by one-half inch by 3 inches and the latter immersed in a dish of warm physiologic solution of sodium chloride. The apparatus used consisted of an ordinary bell jar connected to a vacuum pump and also to an air line and an oxygen line through separate copper coils, the latter being mounted in dry ice containers.

At the conclusion of each series of the four tests enumerated, all the teeth were again photomicrographed and these photomicrographs compared with the originals for evidence of changes in the teeth or the dental restorations.

When all tests were completed, the filled control and the experimental set of teeth were subjected to a comparative hardness test and to compression tests.

Results

Among the ten Air Corps pilots and observers examined in connection with the clinical phase of this problem, it was found that their flying time at altitudes above 10,000 feet varied from about 200 to 3750 hours; the maximum altitudes reached varied from 20,000 to 39,150 feet, and oxygen use varied from 50 to 1000 hours.

The dental examination of this group showed that each had one or more missing teeth. All had several restorations of different kinds and the general condition of the teeth ranged from good to poor. There was no evidence of any unusual condition or effect that could be attributed to the effects of altitude.

Of the five pilots and observers who were again observed after a period of seven months, it was found that in the interim their flying time at altitudes above 10,000 feet ranged from 6 to 40 hours. The maximum altitudes reached ranged from 17,000 to 25,000 feet in aircraft and 40,000 feet (simulated) in the altitude chamber and oxygen inhalation ranged from 5½ to 40 hours.

In these cases, a comparison of the second with the first dental survey showed only one obvious change. This consisted of the washing out of one small silicate restoration.

In the experimental laboratory study a final examination of both control and the experimental sets of teeth failed to show any evidence of change.

An attempt to make a comparative hardness test of the sets of teeth failed, because in all teeth there was a marked variation in hardness of the enamel in different areas.

A comparative compression test between the restored control set and the experimental set was attempted by mounting the teeth individually in Wood's metal with the crown of the tooth projecting in a normal manner, molding a block of Wood's metal to fit the occlusal surface, and applying measured pressure vertically on the tooth until failure occurred. Unfortunately in every instance the mounting material failed before that of the tooth structure. The pressures sustained are shown in Table 6.

Although no comparative conclusions can be drawn from the compression test, the high pressure that the experimental teeth sustained indicates that all or at least a considerable portion of their original strength was retained.

Conclusions

As a result of a clinical study of a small groups of United States Army Air Corps pilots and observers and a laboratory study of five freshly extracted vital human teeth, it is concluded that the environmental conditions encountered at altitudes between 10,000 and 40,000 feet in addition to the inhalation of oxygen cooled to a maximum of —60° F. have no deleterious effect on human teeth or dental restorations.

Wright Field and
640 *Fidelity Building.*

The Editor's Page

DENTISTRY CAN PROBABLY never be made attractive but it can be made easier to take. The correction of simple dental defects constitutes a greater service to the patient than extensive restorative treatment. Neglect, improper care, and fear are the great destroyers of dental tissues. These fundamental facts were all expressed in one form or another by the 1200 patients who cooperated in the patient study that is being published in this magazine serially since the January issue.

The most significant revelation in this study is that people possess more knowledge of dental facts than is generally believed; that people are not so ignorant concerning dental conditions as most of us have thought. The public in general knows considerable about the objectives and purposes of dentistry. That they do not seek that dental service which they know to be advisable is another matter. Some for economic reasons cannot buy. The majority, however, do not buy because the dental experience is not pleasant.

Any educational effort directed to people en masse, which merely attempts to drive people into the dental office will likely fail. It is not a matter of telling people about dentistry. Most of them know what it comprises. Education must begin once they come to the dental office. We must make each patient feel that his time and money have been well spent—that it has been worth his while to visit his dentist; he must be made to feel this so strongly that the regularity of his visits will become an accepted fact in his life and in the life of his dentist. Every dentist overlooks countless opportunities to increase the scope of his service for the augmented benefit of his patients and the consequent enlargement of his income.

Enough time is usually spent in operating; not enough in explaining. Too much time is frequently spent in extraneous and irrelevant conversation; not enough in treatment planning and presentation. By their presence in the dental office people express their need for and acceptance of the dental service. By their presence in the office of a particular dentist they are expressing their preference for *his* service. The presence of the patient in the office, therefore, represents two obstacles overcome. The patient would not be there if he had not by his own voluntary act presented himself to accept a particular service at the probable exclusion of other goods and services. The patient is practicing definite economic selectivity. He is also practicing personal selectivity. It is not only dentistry he now demands but a particular dentist.

One commentator on the series, WHAT TWELVE HUNDRED PATIENTS KNOW ABOUT DENTISTRY, suggested that the next effort undertaken might be the education of dentists. He did not mean to educate dentists in technical and scientific subjects, but to educate them to their opportunities. His suggestion appears to be a good one. He did not say how this education might be undertaken. There might be considered a plan such as this:

In every community it would be simple to organize a study club concerned with the business principles involved in presenting goods and services. The same principles that are used in pedagogy should be used in the dental office to teach patients. It is the dentist's duty and prerogative to point out all possibilities and eventualities in the types of service he can offer; it is his right to recommend; then, it is the patient's obligation to choose from among the possible services proferred. It is not for the dentist to assume that a working girl can only afford an amalgam restoration and reserve the suggestion of a gold inlay for the banker. The working girl may evaluate her teeth and the care they deserve more highly than the banker.

Every patient should be told the health story of dentistry in the particular terms that he can comprehend. Health, cleanliness, and appearance should be the points emphasized. Patients should be made aware of the end-results and values of dental treatment; they are not interested in the intimate details of procedure and technique that are used to reach these ends. If we are to be true to the "doctor" title, we should be prepared to spend more time in teaching.

The Removal of Anterior Maxillary Roots

RALPH W. EDWARDS, D.D.S., Kansas City, Missouri

DEVIATIONS FROM normal jaw contour present an unsightly appearance, especially in the anterior region of the mouth; moreover, malformations in jaw contour which are the result of unskillful tooth removal can be prevented if proper measures are instituted.

One of the areas most frequently involved is that of the lateral incisor region. The lateral incisor, the smallest of the maxillary teeth, has a slender root, narrow mesio-distally, which affords only limited rotary movement in forceps application; as a consequence, the lateral incisor fractures more easily than any of the anterior teeth. In the removal of this fractured root, the common tendency is to attempt removal by the application of narrow-beak forceps, which more often results in injury and laceration to surrounding tissues than it does in permitting easy delivery of the root.

Again, the approach to this problem

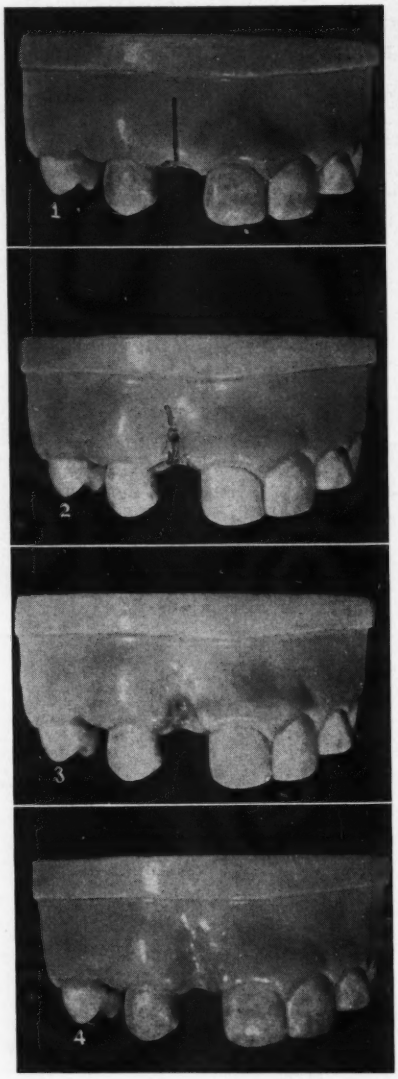


Fig. 1—Improper design and location of incision directly over fractured root. Tissues when replaced will collapse.

Fig. 2—Eight days after removal of the root. Labial tissues collapsing into socket. (The models shown in Figs. 2, 3, and 4 were made from plaster impressions of such a case at the intervals indicated.)

Fig. 3—Sixteen days after removal of the root. Jaw contour destroyed.

Fig. 4—Three months after removal, showing complete loss of labial contour. This result creates an extremely difficult problem in making a satisfactory dental restoration.

Fig. 5—Proper design and location of incision. Note that incision is placed over adjacent tooth. Compare with Fig. 1.

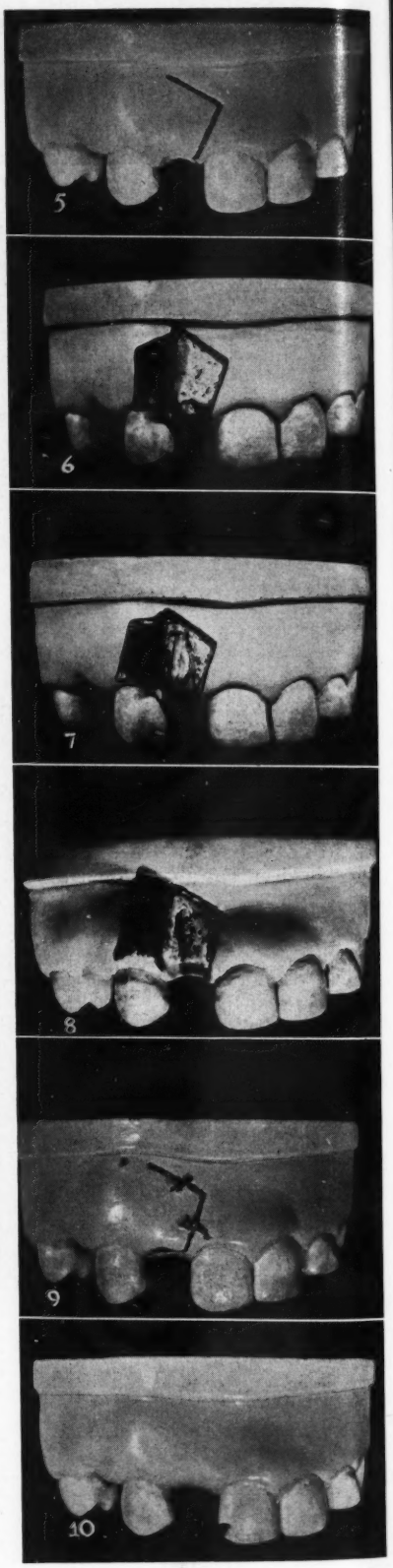
Fig. 6—Tissue retracted, exposing alveolar process.

Fig. 7—Alveolar process has been removed to a point about midway on the root.

Fig. 8—Root removed. The bone periphery should be smoothed before replacing and suturing tissue.

Fig. 9—Tissue replaced in original position and sutured. Note how tissue, resting on bone substance and securely fastened with sutures, tends to preserve the labial contour.

Fig. 10—Final result after healing. Contrast with Fig. 4.



is improperly handled by employing the wrong type of incision preparatory to tissue retraction. Fig. 1 illustrates this particular fault, wherein the incision has been made directly over the root. This type of incision precludes the possibility of bone substance remaining to support the tissues after the root has been removed. Fig. 2 presents the area eight days after removal, with the tissues collapsing for want of bone support. Fig. 3 shows the area sixteen days after removal of the root, with new tissue filling in the socket, and jaw contour permanently destroyed. Fig. 4 reveals the result three months after removal, exhibiting an unesthetic condition, and leaving a difficult problem in esthetics for the dentist.

Technique

1. To prevent uneven jaw contours following root removal, care in the design and location of incisions preparatory to tissue retraction should be observed. The design and location of the incision in Fig. 5 is such that the tissue, when retracted, will afford ample access to the root, and when it is replaced after the operation, it will be lying on a substantial bone foundation.

2. After the tissue is retracted (Fig. 6) a portion of the labial alveolar plate is removed (Fig. 7) to allow easy delivery of the root. A thin concave blade elevator can be placed between the root and the lingual alveolar plate and the root dislodged from its alveolus (Fig. 8).

3. Before the tissue is replaced the roughened edge of bone should be smoothed in order to prevent irritation.

4. Number 00 catgut suture is used to retain the flap in position (Fig. 9). The replacement and suturing of the tissue in its proper position tends to maintain the jaw contour where the root was removed, with the result shown in Fig. 10.

Comment

Malformations of the jaw following tooth removal can be prevented by care in the design and location of incisions previous to the retraction of tissue.

Tenth Street and Troost Avenue.

TO THE *Editor*

I WANT TO tell you how much I appreciated your editorial[1] on temporary and permanent dentures. The value of this editorial, particularly to those of us specializing in denture prosthesis, cannot be overestimated. I want to prevail upon you to write another editorial on the subject of denture base materials.

Patients do not recall the spoken word. It is my custom to discuss the "permanence" of the fit of dentures with my patients according to the indications in the individual case; but usually little that I have said is recalled when rebasing or new dentures are required. This sometimes gives rise to an embarrassing and unfair situation in which in order to avoid a dispute and unpleasantness, the work is done free of charge. Your editorial will help us immeasurably in correcting this situation.

With reference to the all-pink denture base materials, there is unquestionably a place for these pink, lifelike materials. They are esthetically desirable, and virtually every denture patient wants an all-pink denture, and, in about the same proportion, holds the dentist responsible for the behavior of the material. The scrupulous, conservative, and business-like dentist undertakes to explain the hazard of using these materials and attempts to have an understanding concerning the results to be expected. If a denture constructed of one of these materials loses its color, changes its shape, or if a tooth drops off or the denture breaks, the dentist invariably finds that the patient to whom he has explained these possibilities returns to have the condition remedied without charge.

During the last four and one-half years, I have made for one patient five all-pink dentures, each made from a new impression, in an attempt to get one that would not fracture. Following breakage of the fourth denture, I made one of vulcanite in order to settle the difficulty. The following day the patient returned with the statement that she would not wear vulcanite; whereupon, I made the fifth pink denture. For all this, I received the sum of $150, but not until I had made the sixth and last denture. The patient said that she was financially unable to continue with my service, although she is of the upper financial and intellectual class. Who got the bargain—the patient who received four and one-half years of denture service in advance for $150 or I who received $150 for six dentures at the end of four and one-half years? And the pity is that the patient feels she did not get her money's worth. More pitiful is the fact that I would have continued to remake the denture if the patient had not discontinued my service.

No dentist should be required to assume responsibility for any base material. The dentist can use only that which the manufacturers supply, as selected by the patient. He merely acts as an agent in the matter of materials and he should not be required to assume responsibility for them. The dentist should point out to the patient, however, that, during the developmental period of these newer materials, he must choose between improved esthetics and proved durability—the all-pink material or vulcanite.

If a patient must have a denture made of a new material, then he should also be willing to risk the results of its use, and not exact the same service at the dentist's expense as that afforded by a material known to be satisfactory.

There is a place for the all-pink materials and that place is in cases in which the patient is able and willing to afford them as a luxury—willing to pay the cost in order to have and to maintain them. Were I making a denture for myself, I would make it of one

[1] Editorial, **Dental Digest**, 42:397 (November) 1936.

of the all-pink materials in preference to vulcanite, but I would do so understanding that at any moment it might break, change its shape or lose its color and that I must be willing to undergo the expense and trouble of having a new one made. To protect myself in the case of breakage, I would have two dentures (duplicates), and if I were going to travel, so great would I consider the risk without adequate protection that I would either have the spare denture made of vulcanite or a third one of vulcanite. At present the particular all-pink materials that are used the most are not comparable in strength and durability to the vulcanite which they excel in appearance.

—Rupert E. Hall, D. D. S., *Chicago.*

A Detachable Die Extension

FREDERICK DONER, D.D.S., Watertown, New York

DENTISTS OFTEN WISH the jacket crown or inlay dies had longer extensions. The technique described here will provide an extension of any length without the useless waste of amalgam.

Packing the Die—1. An excellent ferrule for a die is obtained by the use of the gelatin capsule used for dispensing medicine (Fig. 2). The size 0-00-000 is particularly useful as it fits all bands used on anteriors and bicuspids. The top of the capsule is sufficiently larger than the bottom to fit the next larger sized band very well. When the one has been selected which fits the band, the closed end is cut off (Fig. 3).

2. The amalgam may then be packed by any technique desired as the gelatin is strong enough to withstand any pressure.

3. When the amalgam has reached the desired level in the gelatin ferrule a small amount of the soft amalgam is drilled out with a round bur; and a small screw eye, which has been previously oiled, is screwed into this opening (Fig. 4). When the die is partly set, the screw is removed. When it has thoroughly hardened, the end of the die is ground smooth, and the eye cut off near its base. The gelatin capsule is cut away. The impression band is removed, and the base of the die ground to fit the case.

Making the Extension—1. The base of the die is oiled and the screw put in place.

2. A piece of baseplate wax is wrapped around a hexagonal lead pencil (Fig. 5); removed, and luted around the base of the die (Fig. 6).

3. This wax ferrule is filled with quick-setting artificial stone.

4. When the stone has set, the wax is removed; and the rough edges of stone made smooth.

A detachable plaster extension is thus obtained which is long enough to facilitate handling, without a useless waste of amalgam (Fig. 7).

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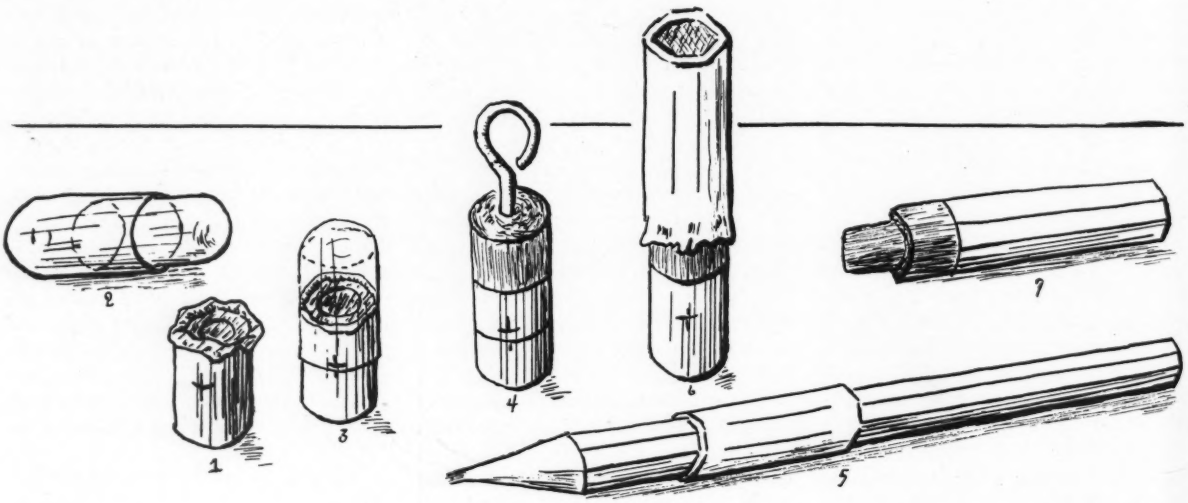

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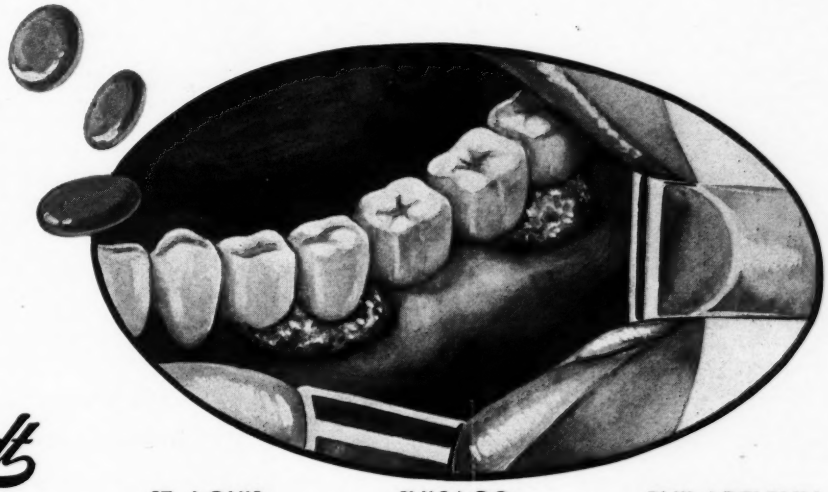

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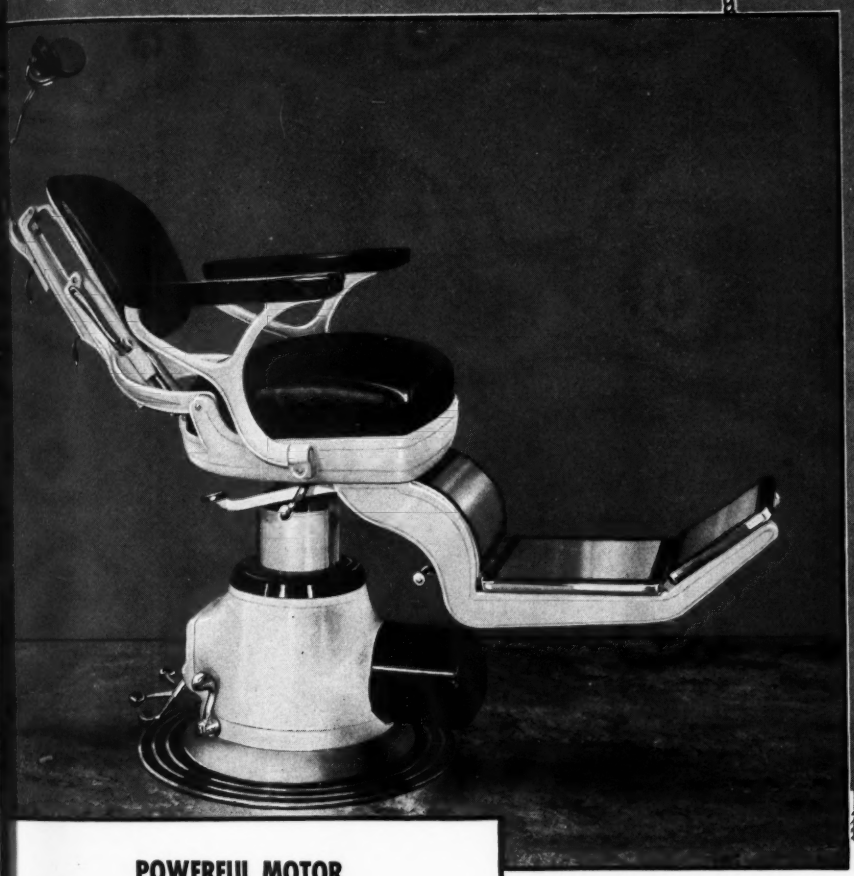

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1887—FIFTY YEARS OF PROGRESS—1937

The Vitamins and Dental Caries

(An Adaptation)

[F. W. Broderick, M.R.C.S., Eng., L.R.C.P.Lond., L.D.S.Eng.: The Relation of Vitamin D to Dental Caries, The British Dental Journal, 62:17 (January 1) 1937.]

Chemical Action of Vitamins

INVESTIGATORS OF THE PROBLEMS of vitamin deficiencies have made no serious effort to explain the exact action of vitamins. They have suggested that vitamin D somehow diminishes the excretion of calcium through the bowel mucosa. This is not, however, an adequate explanation. The chemical formulas of vitamins have been established and the substances have been synthesized; it has therefore been assumed that the vitamins act chemically.

Chemico-Physical Theory of Vitamin Action.

Chemico-Physical Formation of Compounds—The formation of chemical compounds is not just a simple matter of chemistry; the science of physics plays a part; both chemical and physical formulas are worked out for them. All compounds have both a chemical and physical solution as to their activity. "It is possible, therefore, that this chemico-physical concept may throw some light upon normal physiological processes, and upon the action of drugs in the treatment of disease."

Oxidation and Reduction—"So long as oxidation and reduction were considered to be purely chemical reactions, they presented certain difficulties of explanation; it was obvious that just the matter of the transference of oxygen from one substance to another did not explain all the known phenomena; . . . oxidation is now understood to consist of the removal of an electron from a compound, and reduction to the addition of an electron . . . The readiness with which substances part with or take up electrons determine the intensity level of their oxidizing or reducing functions . . . By measuring the oxidation-reduction potentials of a number of substances with which physiology is interested, it has been found that the hormones and the vitamins . . . act in this manner, and of those which have up to the present been the subject of experiment it is known that both adrenalin and vitamin C act by virtue of their reducing properties . . . That is to say that both

these substances act by taking up electrons from some substance which is oxidized thereby." The action of hormones and vitamins is thus seen to be a chemico-physical one and their activity can be determined from the chemico-physical formulas.

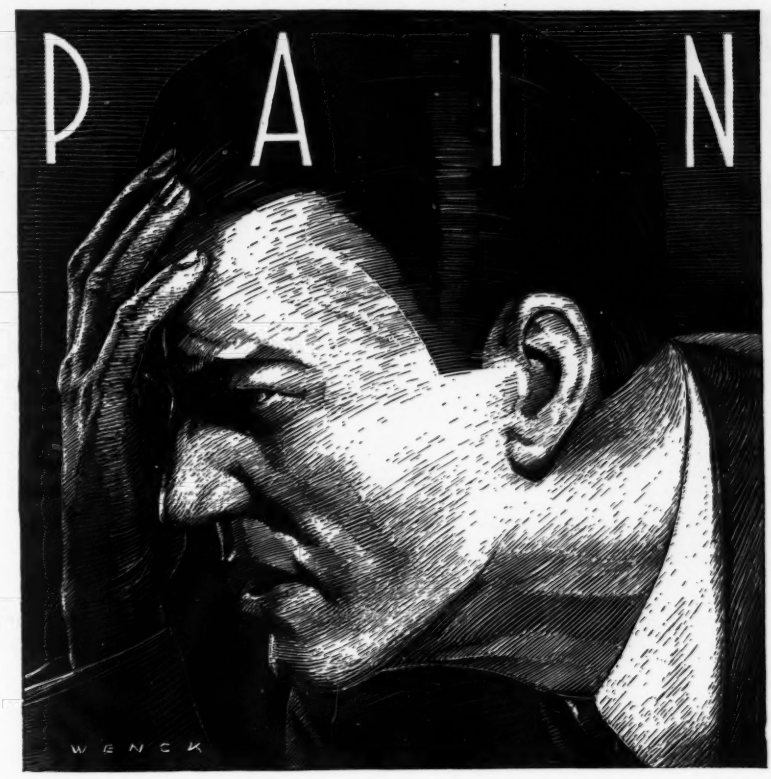
Metabolism—Oxidation and reduction are the essential processes in metabolism; also in the production of energy, growth, secretion, reproduction, and all necessary living processes.

Colloidal State—All living matter is in the colloidal state. "McDonagh believes that the function of all the vitamins and of the hormones is essentially that of preserving the stability of the colloidal system, so urgent a matter for all metabolic processes; that, in other words, these activities are in no way specific functions—for as we shall see later other substances can act in a similar manner; that vitamin C is a dehydrator of the colloid, vitamin D a hydrator, adrenalin and thyroxin dehydrators, and insulin a hydrator, through their oxidizing and reducing properties." Von Hahn expressed the belief that vitamins stabilized the colloidal system by their inherent surface activity. A lowering of surface tension will hydrate, and a raising of this will dehydrate the colloid. Thus the oxidation-reduction ratio is the important feature in vitamin action.

Action of Vitamin D.

Vitamin D is an oxidizing agent; it adds electrons to the plasma colloids which prevents them from becoming dehydrated; that is, it acts with other substances in stabilizing the colloidal system. "A deficiency therefore will not only quicken metabolism with its increase in acid products, but will in other ways . . . completely alter body function. But in addition, through an alteration in the absorptive properties of the colloidal particles, these will be unable to hold the normal amount of blood constituents within the colloidal complex, and calcium, amongst other things, will pass into the blood plasma and be excreted in greater amount. This is the explanation of the increased loss of calcium from the body which is prevented when the vitamin is present in sufficient amount."

Vegetative System—Kraus and Zondek regard the vegetative system as not "a simple one of nervous innervation, through the sympathetic and



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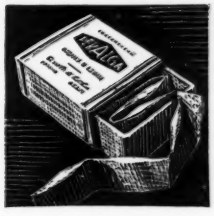

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parasympathetic nerves alone, but rather one in which notice must be taken of the H and OH ions, that is, the acid-base balance of the body fluids, the balance of the mono- and divalent ions of potassium and calcium, the hormonal influences, and the state of the body colloids, all of which acting and interacting together with the involuntary nervous system regulate and control body function." Sir Henry Dale further points out that "the mechanism by which nervous influences bring about their effects is chemical; that stimulation of the sympathetic nerves produces an adrenalin-like substance at the nerve-endings; and that of the parasympathetic nerves a substance known as acetylcholine, which chemical substances are themselves responsible for the effects of nervous stimulation."

Vitamin D, therefore, is seen not to act specifically but through the colloidal system and tends to bring a shift in vegetative balance over to the parasympathetic side; it brings about colloidal hydration, alkalosis, an increase of the monovalent K over the divalent Ca, an increase of parasympathetic nervous influences, and diminished thyro-adrenal activity. A deficiency of vitamin D will bring about the opposite effect. Vitamin D starvation as a cause of dental caries is only one segment of the problem; many other conditions will bring about similar vegetative disturbances; for example, constitutional variations, dietetic errors, over-activity either mental or physical.

The minute doses effective in vitamin deficiencies prove that the substances act through the colloidal system. Enormous doses are required to bring about hypervitaminoses, and "between the small dose necessary to cure a vitamin deficiency and that required to bring about ill-effects no physiological change comes about.

Mrs. May Mellanby's Results—To understand the reason for Mrs. Mellanby's limited success it is necessary to consider the factors of heredity and environment, constitution and stress. Vitamin treatment might remove some dietetic stress which if other stresses were not too severe might prevent acidosis and resultant caries. "If the constitutional deviation—itself a matter of vegetative imbalance—happened to be extreme, this slight lifting of an environmental stress would be insufficient, and caries

"HERE IT COMES!"
by Charles Jacques (1813-1894) France.
Caricature published in Charivari in 1843. A commentator writes, "The dentist shows no lack of enthusiasm for his work and the patient seems to lack a detached attitude towards the operation."

would result, notwithstanding the vitamin feeding; and increasing the vitamin would have no effect whatsoever."

Summary

1. There is nothing mysterious about the actions of the vitamins and of the hormones; they act along recognized lines of chemico-physics, and deficiencies bring about recognized disturbances of normal physiologic processes.

2. Many other substances will do exactly the same thing, and will control the necessary oxidation-reduction phenomena almost as satisfactorily, but the activity of the hormones and vitamins is Nature's method.

3. Vitamin D deficiency may produce dental caries by an abstraction of electrons with its colloidal dehydration, and thus disturb vegetative balance in the direction of sympathetic excess, with its accompanying acidosis, excess of Ca ions, and thyro-adrenal stimulation.

4. Conversely vitamin C deficiency may be productive of pyorrhea.

5. Any vegetative disturbance other than that of vitamin deficiencies may bring about similar consequences.

6. Vitamins do not act as specific agents at all.

7. From the point of view discussed, it is doubtful whether the term deficiency diseases should be used at all.

8. DENTAL CARIES IS NOT A DEFICIENCY DISEASE. VITAMIN D DEFICIENCY IS ONLY A MINOR FACTOR ASSOCIATED WITH IT. DENTAL CARIES AND PYORRHEA ARE SYMPTOMS OF DISTURBED VEGETATIVE FUNCTION, NOT DISEASE ENTITIES. VITAMIN THERAPY IS MERELY A USEFUL ADJUNCT TO BRING ABOUT OXIDIZING FUNCTION FOR PERFECT METABOLISM.

Allergic Cause of Periodontal Disease

(An Adaptation)

[James C. Healy, M.D.: Allergy As an Etiological Factor in Acute, Chronic and Recurring Forms of Periodontal Disease, The New York Journal of Dentistry, 7:38 (February) 1937.]

THE DEPARTMENT OF Clinical Medicine and Oral Pathology of Tufts College

Dental School has been conducting an investigation over a period of two years on the relation of allergy to acute or chronic forms of periodontal disease.

Definition—"Allergy is a term which is associated with the changes of tissues or organs resulting from hypersensitiveness of the constituent cells to specific proteins, the products of protein metabolism, or, less commonly, other foreign substances, such as drugs, chemicals, or fatty substances."

Manifestation—"Allergic response is manifested in tissues or organs where smooth muscle, mucous membrane, and skin occur. These reactions tend to occur in somewhat localized areas and one protein may affect one particular region while another type of protein may produce a reaction in some other area . . . Allergic reaction may be evident at birth or at any time thereafter when the individual contacts the particular proteins to which he is sensitive, or whenever his latent hypersensitiveness is aroused by infection or tissue trauma."

Oral Application—It is an accepted fact that the mucous membranes of the nose and throat are sensitive to various types of protein in certain persons. The skin is often sensitive to contact with protein or the split products resulting from protein digestion. The mucous membranes of the oral cavity were, therefore, studied from this point of view. The tissues of the oral cavity are in contact with more proteins than any other tissue.

Local Sensitization—An extensive capillary bed supplies the gingival tissues and the mucous membranes of the oral cavity. Arterioles supplying these tissues would manifest allergic reactions in the case of sensitivity. The result would be a (1) marked interference with the circulation, (2) the escape of the blood constituents into the surrounding tissues, and (3) the production of an edematous condition. The end-result of such a constant or recurring condition would be the obliteration of the capillaries with consequent atrophic changes in the tissues. Trauma induced by mastication, toothbrushing, and massaging will increase the permeability of the tissues to allergens and produce periodontitis. Dental operations, therefore, should be performed with caution to prevent such predis-

position of the tissues to allergic reaction.

Diagnostic Basis—The presence of eosinophile cells in the gingival blood was the first step in the diagnosis of allergic periodontal disease, because these cells increase in allergic reactions. The second diagnostic observation in the differential count of the blood is the decrease of polymorphonuclear neutrophiles and the increase of the nongranular white blood cells.

Method of Examination—1. The history is important to determine whether previous attacks of periodontal disease have been experienced by patients. Patients may show a negative reaction at one time and positive at another. Acute cases represent intermittent exposure to an allergen and chronic cases of allergic gingivitis or periodontoclasia represent types that are constantly exposed to allergens.

2. All periodontal cases are classified according to routine procedures.

3. Routine gingival smears are taken to determine the type and number of organisms present in and near the lesions.

4. All local and systemic symptoms are noted.

Differential Blood Counts—In the first series of cases comprising more than one hundred cases, differential blood counts were obtained from both the gingivae and the ear of the patient. This was done to compare the local eosinophile blood count with the count of the blood taken from the general circulation. In all positive cases the gingival blood showed an increase in eosinophile cells, ranging from 15 to 45 per cent. The eosinophile count from the ear blood was normal in almost all cases. The cases that showed eosinophilia in both specimens gave histories of recent or concurrent asthmatic or other allergic attacks. The reaction in the gingival eosinophilia, therefore, is probably local, although it is also possible that a gingival eosinophilia may be coincidental with a general increase in the number of cells.

Skin-Testing—When the observations are positive for gingival eosinophilia, the patient is tested for food and contact proteins; in the average case, approximately 165 allergen tests are made by the "indentation method" of skin-testing.

Treatment—In the first series of

Don't Expect SPONGY Gums
to Support a Denture Like FIRM Gums Do

Picture in your mind the difference between the firm elasticity of solid rubber and the too yielding softness of a sponge.

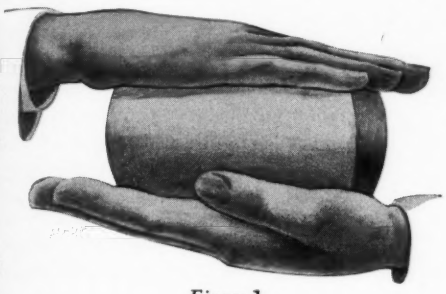

Figure 1

A piece of solid rubber squeezed between the hands, as in Figure 1, yields but slightly and scarcely changes its normal shape.

Figure 2

But a sponge squeezed between the hands (Figure 2) gives way completely under pressure, and remains a shapeless mass until pressure is removed.

Gums React Similarly to Pressure

Now this simple reminder of how a piece of solid rubber and a soft sponge act, when squeezed by the hands, suggests how much better firm, healthy gums hold up under chewing pressure than spongy gums.

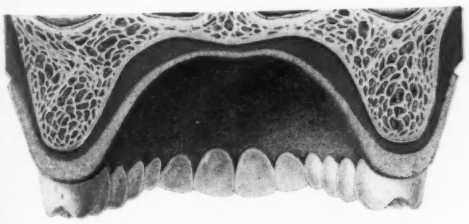

Figure 3

When a dental plate rests on firm gums (Figure 3), it can take the full force of chewing without the gums yielding any more than is necessary to prevent harmful friction or destruction of delicate mouth membranes. The gum-ridge fits the denture at all times because it never loses its shape. The denture stays up better and feels more comfortable.

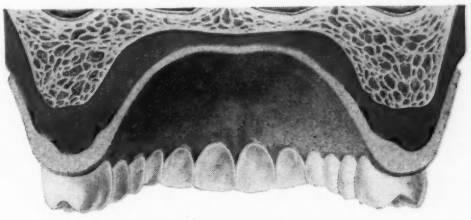

Figure 4

Spongy gums, on the other hand, (see Figure 4) yield and change shape too much under chewing pressure, so the denture wearer is handicapped in his efforts to divide and grind up the food he eats to the consistency needed for proper digestion, because the gum-ridge fails to fit the denture and cannot hold it up.

Now if your gum-ridge is flabby and yielding, you should realize that your dentist faces no easy task in making a denture that will stay in place, look natural, feel comfortable, and give good service. Your dentist can't give you new gums, but with your patient cooperation he will give you the best fitting denture possible.

cases no local treatment was instituted. The elimination of allergens to which the patient was sensitive produced a positive improvement in the color and tone of tissues. Pain and a tendency to hemorrhage usually ceased and the tissues became almost normal even when calculus was present.

The use of sodium perborate as a mouth wash was not noted to be helpful.

Because of traumatization from brushing and the resultant increase of permeability of tissues to the allergen, patients were advised against the use of the toothbrush until the acute symptoms subsided.

Results—"Our treated cases, over a period of two years, have shown no tendency toward retrogression or recurrence where the patient has been faithful in carrying out our instructions as to elimination of protein contact. We also have noted that calculus formation has been markedly decreased. Of course, in all cases, measures for the removal of local factors were instituted following the observation period. The acute cases of gingivitis showed an almost immediate response to the elimination of the allergens and clinical symptoms disappeared or almost disappeared within ten days to two weeks. Cases of chronic gingivitis and those of advancing periodontoclasia responded more slowly.

Conclusions—1. Any allergen to which a patient is sensitive may be a factor in local eosinophilia.

2. Most patients with periodontoclasia and gingival eosinophilia show positive reactions to constituent proteins of milk, eggs, wheat, and other dietary staples.

3. In acute cases the offending allergens are of wider variety.

4. Children showing early periodontal lesions frequently show sensitivity to foods believed to be highly protective, such as spinach, oranges, and lettuce.

5. Bacterial allergy was found to be common among medical internes, dental students, and nurses.

The Publisher's *Notebook*

BROWSING TODAY IN an old book, volume I of *The History of Dental Surgery* published in 1910, I came upon a chapter devoted to the founder of THE DENTAL DIGEST, Doctor J. N. Crouse. Forty-eight years ago, in 1889, Doctor Crouse founded the Dental Protective Association of the United States and incorporated it as then announced, with the object "to unite the strength of the profession, to contest the patents of the International Tooth Crown Company, the validity of which have not been established." Six years later, in 1895, Doctor Crouse established THE DENTAL DIGEST as the official organ of the association.

As a practicing dentist Doctor Crouse had been obliged to pay tribute to the Dental Vulcanite Company, under the Cummings patent, for the use of vulcanite in dentures. John A. Cummings had been granted the patent in 1864; it was later reissued to the Dental Vulcanite Company, and, finally, the Goodyear Company became owner by assignment. The latter, for a fee, licensed dentists to use vulcanite.

According to *The History of Dental Surgery*, "These licenses were generally given for one year, and were signed by the licensee, the agent, and Josiah Bacon, treasurer, who, on account of his arbitrary methods and meanness in dealing with the dental profession, was shot and killed in San Francisco. The contest as to the validity of the patent between the Goodyear Company and the whole dental profession of the United States was long and bitter. Finally, Doctor S. S. White took up the cause for the profession and spent much time and money, and in the end won the case and wiped out the abomination." Likely inspired by Doctor White's success in fighting the Goodyear case, Doctor Crouse decided to resist the licensing plan of the International Tooth Crown Company. According to this old history, a representative of that company ap-

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proached Doctor Crouse with an offer to "cooperate" with the concern at a personal profit. The doctor refused. Instead he engaged an attorney and went about the business of organizing the Dental Protective Association. Prospectuses were sent to the entire profession urging that dentists unite to fight the crown company's claims. The latter sought to force all dentists to pay a royalty on "all or any banded or gold crowns they have ever made or may make in the future."

The association's directorate included Doctor Crouse, Doctor Truman W. Brophy, and Doctor E. D. Swain, all of Chicago. The treasurer was the Honorable Lyman J. Gage, then a Chicago banker, later Secretary of the Treasury of the United States. Seven thousand dentists joined, each paying the ten-dollar fee.

In 1895, seven years later, THE DENTAL DIGEST was able to report of the association that "so far in its history it had won every suit which had been brought against any of its members." At that time one suit against the International Tooth Crown Company was still pending, having to do with the Low Bridge patent. Simultaneously, the association was defending two other patent suits "brought against its members by other patent companies and in addition to these, still other suits are threatened." The association was not established purely for the purpose of defending patent suits, "but to band the profession together and place it in a position where it can successfully resist extortion or injustice in any form."

That same year at an Asbury Park, New Jersey, meeting the association's members considered the question of disbanding the organization after decisions had been reached in the pending cases, but it was finally decided to continue so as to provide protection against further efforts to exploit the profession. Later, in three states the crown company's suits covering the Low Bridge patent were dismissed—a great victory for Doctor Crouse and his association. This saved dentists a good deal of money and gave them, moreover, "a period of peace and security from all such exactions."

But in 1899, the crown company secured a favorable judgment in another Low Bridge patent case. Immediately the concern repeated its

demands upon dentists in eastern states, even putting receivers in the offices of several Boston dentists. Within a year, however, the association won out, and forced the crown company to pay all costs of legal proceedings. *The History of Dental Surgery* states: "Shortly after this, the parties who had been defeated, approached Doctor Crouse with the suggestion that a man of his energy and capacity ought to be a millionaire himself, and that they might suggest to him a way by which the road to affluence would be open to him. A request was made upon him for an interview, to take place at a Chicago hotel. During this interview, which was held in the presence of a concealed witness, the proposition was made to Doctor Crouse that he, as the chairman of the directors of the association, should permit them to win two or three suits. In consideration of this, they would place at his disposal for his own use, a sum double as large as all the dues that had been paid by members of the association for its support, and that in addition, they would place him in a position to receive percentages of all the amounts to be collected in the way of royalties from the dental profession. This proposition was promptly declined, and the fight in the interests of the profession continued as loyally as before.

"After the main fights were won, the directors found it necessary to raise more money to carry on succeeding litigation, and they determined, under the bylaws of the association, to levy an assessment upon the members. This assessment was only responded to by a very small number of the members. . . .

"Early in the year 1900, the crown company had commenced about fifty suits, all of them east of Ohio. Later they secured an order from a court in New York which compelled one of the members of the association to present his books and have the same examined by a master of the court. This proceeding was objected to by the attorney of the association, but overruled by Judge Lacombe, and the examination of the books was carried out. This decision was used by the crown company as an additional cudgel for intimidation of the dentists, but the following week when this company made an attempt in Boston to secure a decision in the same direction, the Federal Court of

appeals there refused their order and pronounced the procedure illegal.

"An editorial in THE DENTAL DIGEST for May, 1904, gives a full explanation of the final victory achieved by the association, from which the following is extracted:

"This judge decided, and so ordered, that he had the power to compel the attendance of several members of the association before a court official, making them to submit to an examination, day after day, of all the work done by them in the mouths of their patients, of their books describing the same, and giving the names and addresses of each individual patient. This testimony was taken prior to the final trial, before a master in chancery, with a view to ascertaining how much crown and bridge work these dentists had done, the nature of the work, etc., and thus determining for how much they were liable to the crown company.

"One of these cases was afterwards tried before a jury under the instruction of a judge and a partial finding was made against the dentist. This case was then taken by the association to the United States Circuit Court of Appeals for the second circuit, and by it sent to the Supreme Court of the United States upon the question as to whether or not any Federal judge had the power to so compel an examination of any dentist in this manner.

"The Supreme Court of the United States reversed the trial judge and decided that 'in no patent case in an action at law can any dentist in this country be compelled, antecedent to the trial, to appear before any court official and be subjected to any questioning whatever regarding his practice or his patients.'"

"The proposition laid down by the Federal judge in New York, namely: 'The practice of examining before trial under the New York practice is the most wholesome one; it tends to simplification of the trial and frequently leads to settlement out of court,' was probably correct, in the sense that the case would be simplified by such proceeding, and that a settlement without trial might be reached. But that the results under this New York code would inure to the securing of justice or equity is not so certain. The editorial continues:

"We wish here to compliment the members who did act thus loyally and allow this question to be finally settled, as it has been in the Supreme Court of the United States, and who thus aided in annulling a practice which was harsh, vicious and indefensible.

"We have been quiet about this litigation and this point, but will now frankly confess that if we had not succeeded in defeating this ruling the protective association would have been powerless to have aided its members in assaults made upon them under this practice. As the matter stands, however, every dentist in the United States has great cause for congratulations.

"It is no disparity to others to state that the master mind that was ever watchful during the struggle that ensued between the Dental Protective Association, and associated and other efforts against parties who were determined to wring unjust contributions from the members of the dental profession, under the guise of privileges granted by United States patents, was Dr. John N. Crouse. To his pugnacious persistency, loyalty and ability, the dental profession in this country is indebted for its liberation, and for the freedom from similar impositions it now enjoys."

MERWIN B. MASSOL, *Publisher*

DENTAL MEETING

Dates

American Society for the Advancement of General Anesthesia, regular meeting, Tower Room, Hotel Montclair, New York City, Monday evening, March 22.

Annual Spring Session of the Old Dominion Dental Society, Lynchburg, Virginia, April 1-2.

Louisiana State Dental Society, fifty-seventh annual meeting, Roosevelt Hotel, New Orleans, April 8-10.

Alabama State Dental Association, sixty-eighth annual meeting, Battle House Hotel, Mobile, April 12-14, 1937.

American Society of Orthodontists, thirty-fifth annual meeting, Edgewater Beach Hotel, Chicago, April 19-22, 1937.

North Carolina Dental Society, sixty-third annual meeting, Carolina Hotel, Pinehurst, May 3-5, 1937.

Cleveland Dental Society, sixth annual clinic meeting, May 3-4.

Dental Society of the State of New York, sixty-ninth annual meeting, Waldorf-Astoria, New York City, May 4-7.

Pennsylvania State Dental Society, sixty-ninth annual meeting, William Penn Hotel, Pittsburgh, May 4-6, 1937.

Tennessee State Dental Association, seventieth annual meeting, Knoxville, May 10-13, 1937.

Ontario Dental Association, seventieth annual convention, Royal York Hotel, Toronto, Canada, May 17-19.

Swampscott Convention, Northeastern Dental Society, New Ocean House, Swampscott, Massachusetts, June 7-9.

(*Continued on next page*)

DENTAL MEETING DATES (Continued)

American Dental Assistants Association, thirteenth annual meeting, Atlantic City, New Jersey, July 12-16.

Indiana State Dental Association, annual convention, Claypool Hotel, Indianapolis, May 17-19.

Missouri-Kansas joint meeting, New Municipal Auditorium, Kansas City, May 16-19.

American Academy of Periodontology, twenty-fourth annual meeting, Claridge Hotel, Atlantic City, New Jersey, July 8-10.

American Dental Hygienists Association, annual meeting, Atlantic City, New Jersey, July 12-16.

Association of American Women Dentists, sixteenth annual meeting, Atlantic City, New Jersey, July 12-16.

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